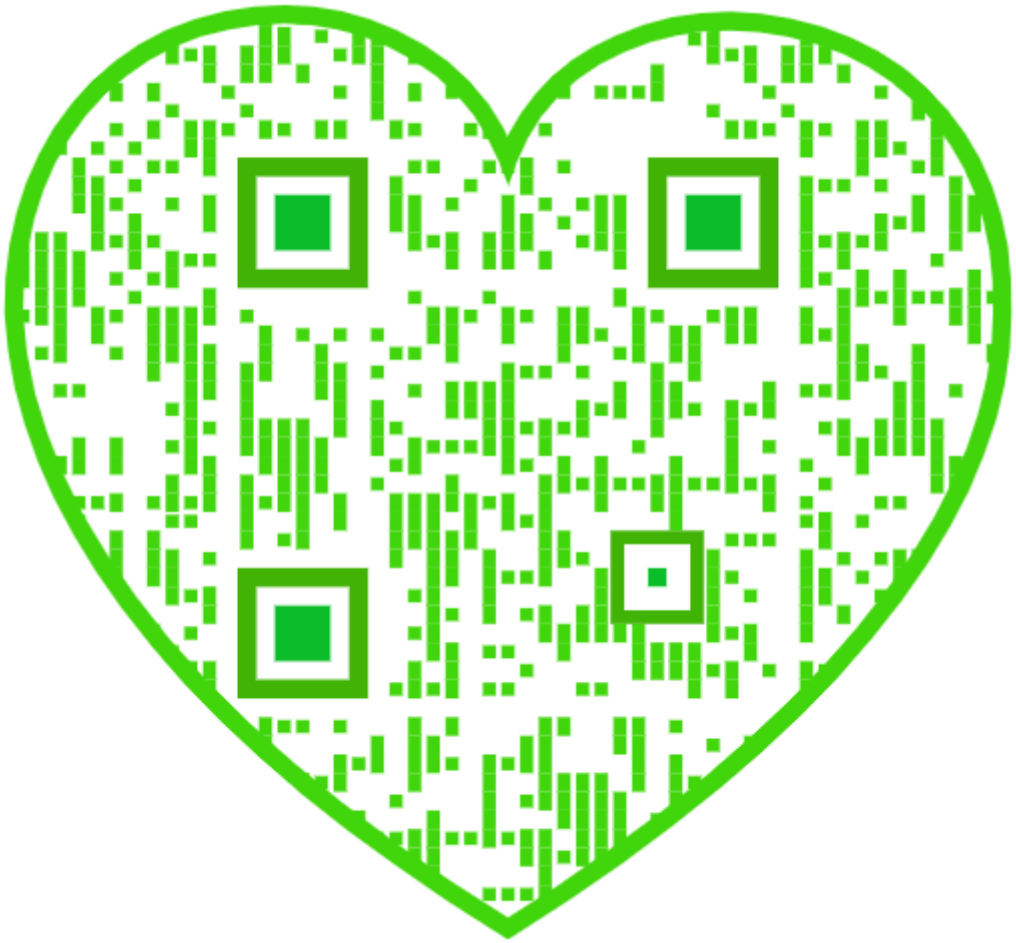

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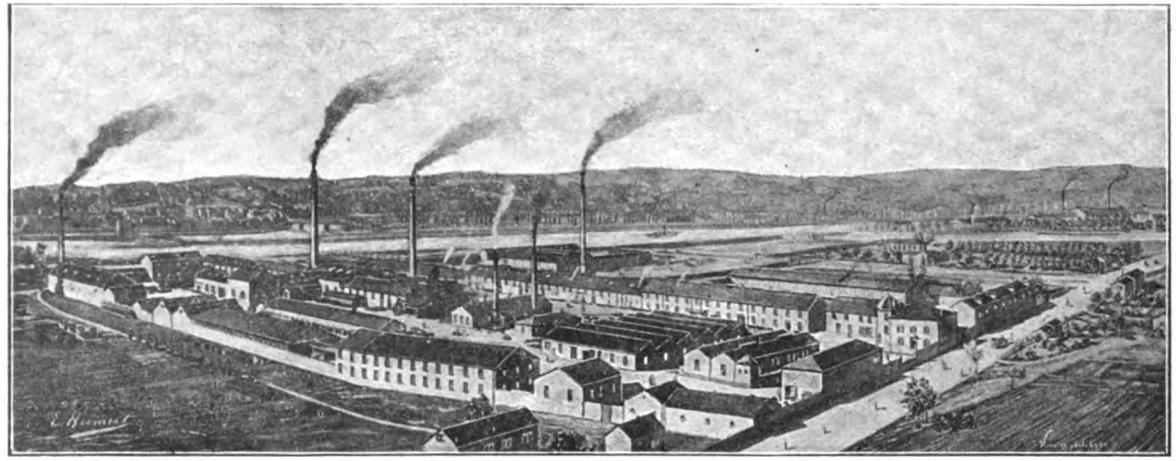
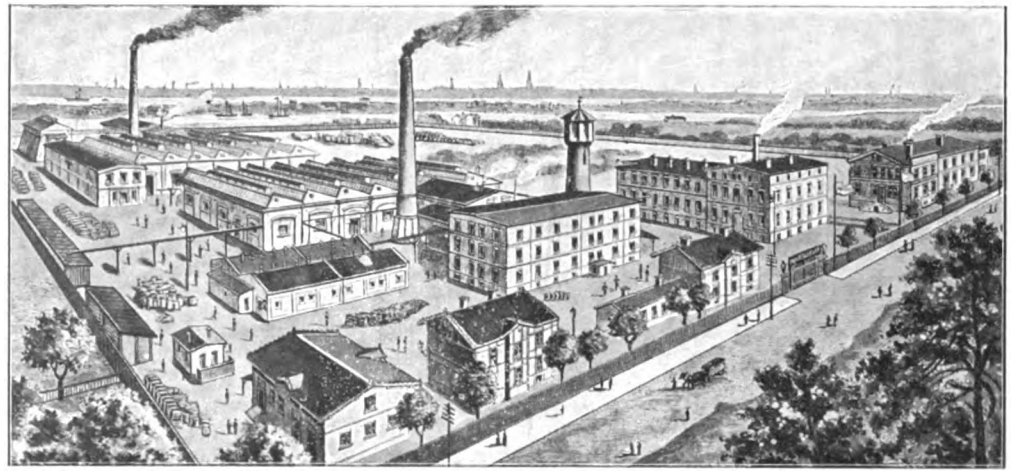


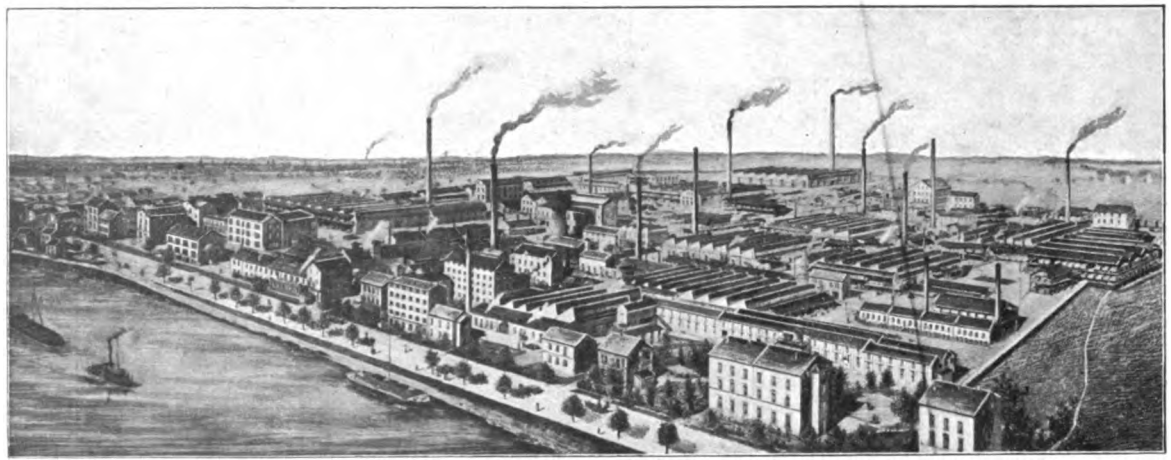
Works "La Mouche".

RUSSIAN ANILINE COLOUR WORKS LEOPOLD CASSELLA & Cº, RIGA.



Works at Riga.

LEOPOLD CASSELLA & Cº, G. m. b. H., FRANKFORT o. M.



Works at Mainkur near Frankfort o. M.

THE DYEING OF WOOL

INCLUDING WOOL-PRINTING

WITH THE DYESTUFFS

OF

LEOPOLD CASSELLA & Co

G. m. b. H.

FRANKFORT o. M.

AMERICAN BRANCH:

CASSELLA COLOR COMPANY

182 AND 184 FRONT STREET

NEW YORK.

BOSTON: 68 ESSEX STREET

PHILADELPHIA: 126 AND 128 SOUTH FRONT STREET

PROVIDENCE: 64 EXCHANGE PLACE

ATLANTA: 47 NORTH PRYOR STREET

MONTREAL, P. Q.: 86 AND 88 YOUVILLE SQUARE.

PUBLISHED BY

LEOPOLD CASSELLA & Co, G. m. b. H., FRANKFORT o. M.

1905.

7609.05.3

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Preface.

With our book, "The Diamine Colours" published in 1896 and also with our later issued work, "Cotton Dyeing" and the "Supplement" thereto published quite recently, we have produced fundamental works on the application of our dyestuffs.

The present volume contains a synopsis of our Wool Colours arranged according to the same approved principles. The properties of our dyestuffs, including an exact determination of their fastness, and also their application in the various branches of wool dyeing are therein fully dealt with on the basis of practical experience.

The first part of the new book contains a description of our Wool Colours with particulars of their fastness to light, washing, milling, alkalies, stoving, carbonising, and steaming, their behaviour in dyeing woollen goods containing both cotton and silk shot effects also being duly noticed. In the second part the dyeing of loose wool, shoddy, slubbing, yarns and piece-goods, as well as the dyeing of hats are dealt with in detail, and a description of the printing of piece-goods, slubbing and yarn and of the methods of discharging concludes the practical part. A short appendix treats on the principal chemicals used in wool dyeing.

The present book being the collective result of many years' most assiduous study, we hope that it will be of good service

in practice and also find like recognition to its predecessors. Our aim will be to supplement it in accordance with the progress of the industry it describes, and we therefore beg to solicit from our numerous friends, to whom we already owe so much valuable information, a continuance of their kind assistance in our endeavour.

Frankfort o. M., June 1905.

Leopold Cassella & Co.
G. m. b. H.

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NAPHTYLAMINE BLACK IS THE SCIENTIFIC NAME OF THE COLOR KNOWN COMMERCIALLY AS ALIZARINE BLACK.

THE LANACYL COLORS ARE KNOWN COMMERCIALLY AS ALIZARINE LANACYL COLORS.

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B. Chrome Colours.

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C. Diamine Colours.

D. Eosine Colours.

E. Basic Colours.

Dissolving the Dyestuffs.

The wool colours are best dissolved by pouring pure boiling water on them; as a good many dyestuffs precipitate with lime, condensed water may be used to advantage.

When dissolving basic colours, calcareous water should be acidulated with a little acetic acid. Basic colours which are more difficultly soluble are best stirred first to a paste with a little acetic acid and after standing for some hours dissolved by pouring on hot water.

It is best to strain the dyestuff solution through some cotton cloth or a fine sieve when adding it to the dyebath. Any undissolved particles are brought into solution by rinsing the filter with hot water.

A. Acid Colours.

Dyeing Wool with Acid Colours.

General Remarks.

The acid colours are almost invariably dyed on wool in acid baths (an exception is Alkaline Blue which is dyed according to a special method).

For acidulating the liquors, sulphuric acid, bisulphate of soda, acetic acid, and in certain cases also formic acid or oxalic acid are used.

Application of Glauber's Salt.

To ensure perfect levelness and good penetration, some Glauber's salt is usually added to the dyebath in addition to the acid.

It is not as a rule necessary to add any Glauber's salt when using bisulphate of soda, as the latter is already a combination of sulphuric acid and Glauber's salt.

Sulphuric Acid and Bisulphate of Soda.

Sulphuric acid and bisulphate of soda have otherwise the same effect, but the latter is generally given the preference; sulphuric acid as a rule is only used for bright Scarlets to obtain more brilliant shades.

The quantities usually employed in dyeing are

10 % bisulphate of soda or
10 % cryst. Glauber's salt and
4 % sulphuric acid of 168° Tw.

} of the weight of the wool.

Acetic Acid and Formic Acid.

Acetic acid, and less frequently formic acid, are used principally for dyestuffs which exhaust too rapidly with sulphuric acid or do not dye such bright shades, in which case

10 % cryst. Glauber's salt and
7—8 % acetic acid of 8° Tw.

or

10 % cryst. Glauber's salt and
2 % concentrated formic acid

are used instead of 5 % bisulphate of soda.

Oxalic acid is added in special cases (see page 9), in quantities of about 1—2 % of the weight of the goods, in order to neutralise the lime contained in the water.

Temperature and Duration of the Dyeing Process.

As a rule the acid colours require 1 — 1½ hour's dyeing in a boiling bath. In dyeing easily levelling colours (see below), the goods may be entered into the boiling bath and the dyeing be completed at the boil. In dyeing deep shades with the other acid colours the goods may also be entered straight into the boiling bath; it is however better to enter at 60—70° C. (140—160 deg. F.) and to raise slowly to the boil in the course of 15 — 20 minutes.

Exhausting the Dye-liquors.

With 4 % sulphuric acid or 10 % bisulphate of soda the baths of the acid colours exhaust perfectly clear, only in the case of some of the easily levelling dyestuffs very small quantities remain in the dyebath.

To obtain dyeings fast to rubbing, care should be taken to exhaust the bath as completely as possible, which may if necessary be effected by subsequently adding 2 % sulphuric acid or 5 % bisulphate of soda. It is also of special importance to thoroughly exhaust the liquor if the material contains effect threads of cotton, China-grass or artificial silk which are to remain undyed.

The standing baths can always be used over again.

Easily Levelling Acid Colours.

To obtain uniform shades, any of the acid colours may be used very well as self colours.

For the production of compound shades on the other hand, especially in medium and light tones, a selection should be made from the most easily levelling dyestuffs, which are:

Naphtol Yellow S
Fast Yellow S
Acid Yellow AT
Indian Yellow (all brands)
Metanil Yellow
Tropaeoline (all brands)
Orange GG, II, IV, extra

Azo Orseille BB
Lanafuchsine SG, SB
Archil Substitute N
Acid Magenta
Cyanole extra, FF, AB
Tetra Cyanole V
Cyanole Green B, 6G
Cyanole Fast Green G
Acid Green (all brands) } principally for
Fast Acid Green BN } Green and Olive
Acid Violet 4RS, 6BS, 6BC } for Violet and
Azo Wool Violet 7R, 4B } Navy Blue
Azo Wool Blue SE } for Violet and
Indigo Blue N, SGN } Navy Blue
Azo Merino Black (all brands) for Black.

These dyestuffs may also be used for shading dyeings produced with other colours in a boiling bath.

Methods of Dyeing Acid Colours.

Method I.

Acid colours are most generally dyed according to the following method:

The bath is charged with
10—20 % cryst. Glauber's salt and
4 % sulphuric acid (diluted with water)
or with
10 % bisulphate of soda (dissolved in water).

Enter at 60—70° C. (140—160 deg. F.), raise to the boil in 15—20 minutes, and boil for ¾—1 hour, or longer if necessary, until the bath is properly exhausted.

When using easily levelling dyestuffs (page 6), the goods may also be entered into the boiling bath and the colour be fixed by boiling for at least ¾ hour.

In the case of goods difficult to dye through, such as heavily milled material or tightly twisted yarns, the dyeing is frequently commenced without any addition of acids, by first charging the bath with the dyestuff and Glauber's salt only, entering near boiling point, boiling for 20 minutes, and then adding the acid gradually whilst boiling. The first and second portions of acid (1% each), or the first 5% of bisulphate of soda, must be added particularly slowly in order to make the dyestuff go evenly on the fibre and penetrate thoroughly.

Method IIA. The following method is to be recommended for dyestuffs which are dyed in a weakly acid bath:

Charge the bath with

10—20% cryst. Glauber's salt and
2— 5% acetic acid (30%):

enter the goods at 40—60° C. (105—140 deg. F.), raise to the boil in 15—30 minutes, boil for ¾ hour, and exhaust by adding

2% sulphuric acid or
5% bisulphate of soda } in two portions.

If some more dyestuff is to be added, the bath must first be cooled off to 60° C. (140 deg. F.).

Method IIB For Milling Yellow, Milling Red, Wool Red, Lanacyl Blue and Lanacyl Violet, the following method is to be recommended:

Charge the bath with

10—20% cryst. Glauber's salt and
2— 5% acetic acid (30%);

enter the goods at 40° C. (105 deg. F.), raise to the boil in 15—30 minutes, boil for ¾ hour, and exhaust gradually by adding

2—5% acetic acid.

In the case of Lanacyl Blue and Lanacyl Violet, it is recommended to add the full quantity of acetic acid (10%) at the commencement of the operation already, raise to the boil in the course of an hour, and continue boiling for one hour (see page 36).

In the case of goods difficult to penetrate, the dyeing is frequently commenced with the addition of 5—10% acetate

of ammonia instead of acetic acid, the bath being exhausted after ¾—1 hour's boiling by gradually adding acetic acid, formic acid, sulphuric acid, or bisulphate of soda.

Dyeing may also be started neutral, same as described in Method I, the acid being added gradually.

Method III.

The following are the directions for dyeing Naphtyl Blue Black N and Naphtylamine Black R, RNB and NBB:

Charge the dyebath with

1½ % oxalic acid (or up to 2½ % in the case of very calcareous water),
5 % acetic acid (3 % for Blue) and
20 % cryst. Glauber's salt,

add the requisite quantity of dyestuff dissolved separately in boiling water, enter the goods at about 70° C. (160 deg. F.), and raise to the boil in 15—25 minutes. After boiling for about one hour, add if necessary further

3—4 % acetic acid

in order to exhaust the bath; finally add

3 % sulphate of copper,

and run for about another ½ hour without steam.

The addition of sulphate of copper renders the shade somewhat deeper.

Several lots may be dyed consecutively in the exhausted dye-liquor; for this purpose add first to the bath (which has been cooled off to some extent)

¼—½ % oxalic acid,
3 % acetic acid,
7 % cryst. Glauber's salt

and the requisite quantity of dyestuff in solution, exhaust the bath after 1 hour's boiling with

3—4 % acetic acid,

add

2½ % sulphate of copper,

and run for another ½ hour without steam.

In the case of goods which are particularly hard to penetrate, enter at about 50° C. (120 deg. F.), and raise to the boil in 1/2 to 3/4 hour.

Method IV. Alkaline Blue precipitates in an acid bath and is best dyed according to the following method:

Charge the dyebath with

1—2% soda ash

or

3—6% borax

and the dyestuff in solution; enter the goods at about 60° C. (140 deg. F.), raise the temperature to 90° C. (195 deg. F.), and dye at this temperature for about 3/4 hour. A small swatch is then taken, rinsed, and developed in hot, acidulated water.

If this sampling shows that the desired shade has not been obtained, some more dyestuff in solution should be added to the liquor, and the goods then be treated for another 15—20 minutes. If the swatch has the right shade, the goods are lifted, rinsed, and entered into the acid bath, where the Blue develops.

The acid or developing bath is charged with

2 1/4—3 oz sulphuric acid of 170° Tw. per 10 gallons water;

the temperature should not exceed 80° C. (175 deg. F.) in order not to affect the brightness of the Blue. An addition of a little alum, or sulphate of zinc, will increase the fastness to milling of the colour. The goods are turned for 15 to 20 minutes in the hot acid bath and then lightly rinsed in water.

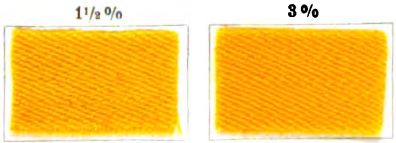
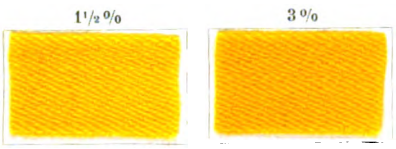
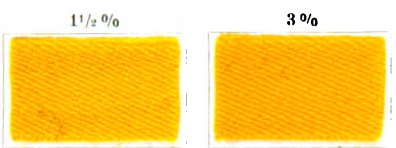
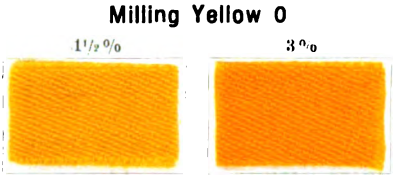
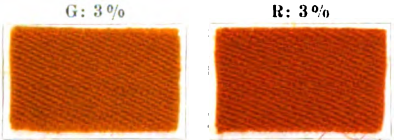
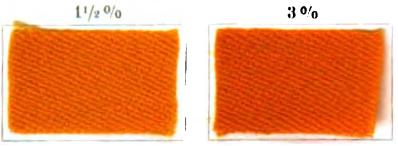
Dyebath and acid bath may be used over again for subsequent lots.

The Acid Colours

including a Tabulation of their Application and Properties.

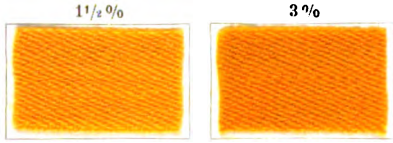
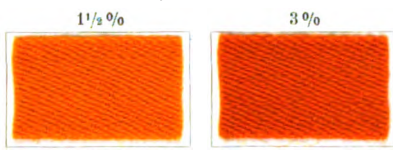
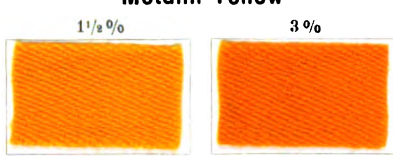
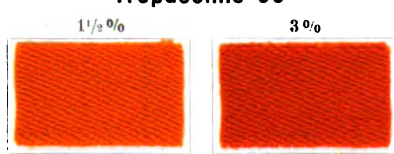
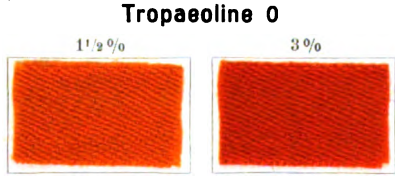
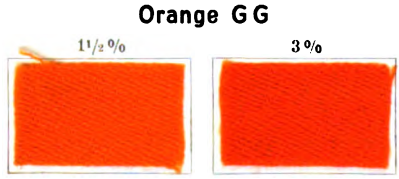
In the classification of the relative properties of fastness, "I" indicates the lowest grade, "IV" the highest degree of fastness.

The particulars regarding the staining of cotton refer likewise to China-grass (ramie), linen and artificial silk. To ensure these fibres remaining white, it is specially important that the baths be completely exhausted.

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Naphtaline Yellow crystals 1½ % 3 % 	With the addition of 10 % Glauber's salt and 5—10 % acetic acid.	I.	I—II.	I.
Naphtol Yellow S 1½ % 3 % 	With the addition of 10—15 % bisulphate of soda, or 10 % Glauber's salt and 4—5 % sulphuric acid.	I—II.	II—III.	I—II.
Acid Yellow AT 1½ % 3 % 	Same as for NaphtolYellow S.	IV.	III. The dyeings withstand well a light washing with soap.	II. The dyeings withstand a light milling fairly well.
Milling Yellow O 1½ % 3 % 	Commence dyeing with the addition of 10 % Glauber's salt and 2—3 % acetic acid and exhaust the bath after ½ hour's boiling by adding further 2—4 % acetic acid.	IV. Exceedingly good.	IV. The fastness to washing is excellent; the shade is not perceptibly altered, and white wool and cotton are not stained thereby.	III. Milling Yellow O dyed in light and medium shades withstands even a severe milling sufficiently well.
Indian Yellow G and R G: 3 % R: 3 % 	Same as for NaphtolYellow S.	"G" brand: II—III. "R" brand: III.	II—III. Wool and cotton are stained a little more severely than by Naphtol Yellow S.	I.
Indian Yellow FF 1½ % 3 % 	Same as for NaphtolYellow S.	III. Turns more reddish, but retains its depth of shade fairly long.		

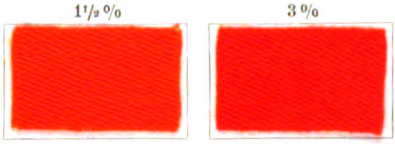
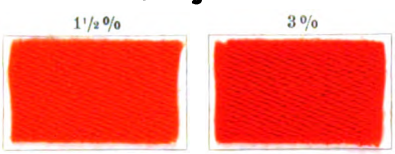
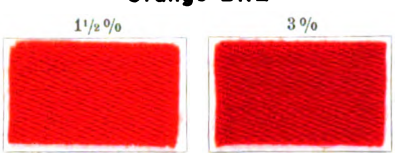
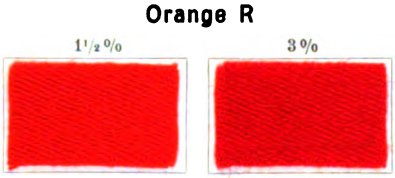
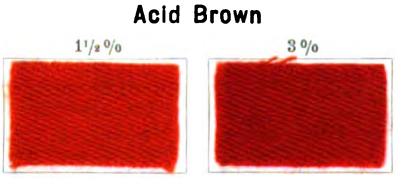
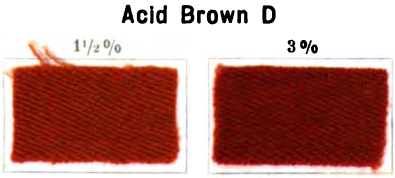
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	III.	IV.	IV.	Cotton is perceptibly stained, and silk is dyed almost the same depth as wool.	*Naphtaline Yellow is used for pure lemon yellow shades on wool and half-wool, whereas the better levelling Naphtol Yellow S is given the preference for shading purposes.*
IV.	IV.	IV.	IV.	Cotton and silk remain perfectly untinted.	*On account of its clear, greenish yellow tone Naphtol Yellow S is largely used for the production of pure Yellows and for shading bright Greens, Olives and other mode shades.* *A further brand, viz. Naphtol Yellow S L differs from the S in its better solubility and is especially less apt to crystallise on cooling.*
IV.	IV.	IV.	IV.	Same as with Naphtol Yellow S.	*Acid Yellow A T is largely employed for the production of yellow shades fast to light and as a yellowing agent for of all kinds of mode and compound shades. It is also applied for goods containing cotton and silk effect threads which are to remain absolutely undyed.*
IV.	IV.	IV.	IV.	Cotton is not stained, silk is however dyed almost the same depth as wool.	*Milling Yellow is superior to all other acid yellows in fastness to light, milling and water. It serves for dyeing fast bright Yellows and, in combination with Diamine Scarlet or Milling Red G, for producing fast shades of orange on loose wool, slubbing, yarn and piece-goods. Milling Yellow is specially used in the carpet yarn industry as the Yellow fastest to light, and in the flannel industry on account of its eminent fastness to milling and stoving; owing to its excellent fastness to light and water it is also used for dyeing facings of uniforms.*
IV.	IV.	IV.	IV.	Cotton is perceptibly stained, and silk and wool are dyed a uniform shade.	*Both brands of Indian Yellow level very well and on account of their good tinctorial power serve principally as shading dyestuffs for Olive, Brown and Black. Compared with Tropaeoline they possess the advantage of not being sensitive to strong acids. They are especially applied for dyeing textures composed of wool and silk, as they cover the silk well. Besides these principal brands there is a third, viz. Indian Yellow (without any further specification), with which tones between Indian Yellow G and R are obtained.*
IV.	IV.	IV.	IV.	Cotton is stained slightly and silk dyed the same shade as wool.	*Indian Yellow F F is distinguished from the above brands by its purer shade as well as by its better solubility and somewhat superior fastness to light and water; it is applied in the same way as the other brands.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Fast Yellow S 1½ % 3 % 	With the addition of 10—15% bisulphate of soda, or 10% Glauber's salt and 4—5% sulphuric acid.	IV.	II—III. The dyeings withstand a light washing with neutral soap.	I–II.
Tropaeoline G 1½ % 3 % 	Same as with Fast Yellow S.	III.	II—III.	I.
Metanil Yellow 1½ % 3 % 		III.	Same as with Tropaeoline G.	
Tropaeoline 00 1½ % 3 % 	Same as with Fast Yellow S.	III.	II—III. Somewhat better than Tropaeoline G.	I.
Tropaeoline O 1½ % 3 % 	Same as with Fast Yellow S.	III.	III.	I—II.
Orange G G 1½ % 3 % 	Same as with Fast Yellow S.	IV. Exceedingly good.	III.	I—II.

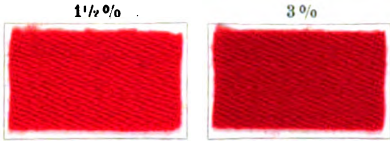
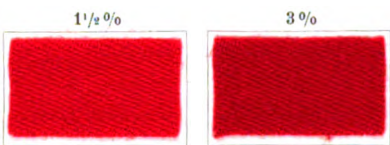
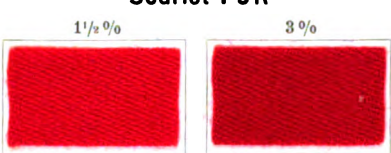
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	III. Becomes paler.	IV. The dyeing is slightly reddened, but the original shade returns on neutralising with soda.	IV.	Cotton and silk remain completely untinted.	*Fast Yellow S serves for producing clear golden yellow shades which are distinguished for very good fastness to light and rubbing. It is also used as a yellowing agent for Brown, Olive and Green as well as for goods containing cotton and silk effect threads.*
IV.	III. Becomes paler.	IV. Same as with Fast Yellow S.	IV.	Cotton is only slightly stained; silk is however dyed almost the same depth as the wool.	*Tropaeoline G by reason of its tinctorial power is a very favourite shading product for Browns with a yellowish cast and for Olives and Blacks. Dyeings should only be sampled after thorough rinsing, as the shade is reddened in a strong sulphuric acid bath.*
		Same as with Tropaeoline G.			*Metanil Yellow differs from Tropaeoline G merely in being less concentrated.*
IV.	III. Becomes paler.	IV. Same as with Fast Yellow S.	IV.	Cotton is heavily stained, silk dyed almost the same depth as wool.	*Tropaeoline 00 is redder in shade than Tropaeoline G and finds generally the same application.* *Acid Yellow in crystals and Orange IV possess the same properties as Tropaeoline 00.*
IV.	III. Becomes paler.	IV.	IV.	Cotton is only slightly stained; silk however is dyed almost as deep a shade as wool.	*The tinctorial power of Tropaeoline O is not quite equal to that of Tropaeoline 00, nor has it the same bright shade, but it possesses the advantage of very good fastness to acids. It is applied in the same manner as Tropaeoline 00.*
IV.	IV.	IV.	IV.	Cotton and silk remain completely untinted.	*Orange GG belongs to the most easily levelling dyestuffs and possesses the best fastness to light. It is used extensively for the production of orange as well as all kinds of mode shades, and also largely for materials with effect threads, as it leaves vegetable fibres and silk perfectly untinted.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Orange II 1½ % 3 % 	Same as for Fast Yellow S.	III—IV.	II—III. Same as with Tropaeoline G.	I.
Orange EN 1½ % 3 % 	Same as for Fast Yellow S.	IV.		
Orange ENZ 1½ % 3 % 	Same as for Fast Yellow S.	IV.		
Orange R 1½ % 3 % 	Same as for Fast Yellow S.	III—IV.		
Acid Brown 1½ % 3 % 	Same as for Fast Yellow S.	II – III.	II—III.	I—II.
Acid Brown D 1½ % 3 % 	Same as for Fast Yellow S.	II.		

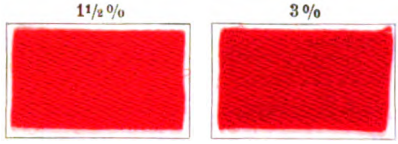
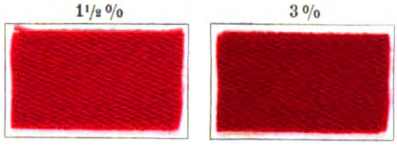
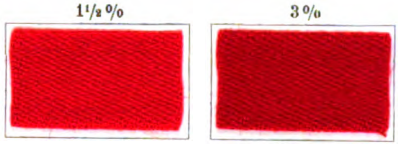
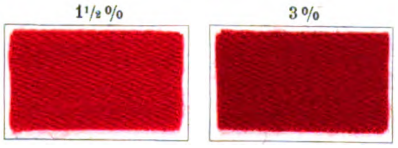
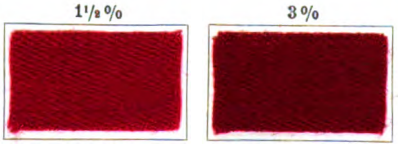
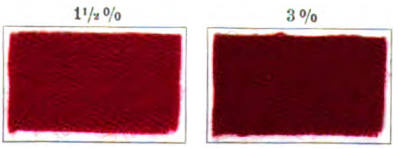
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	IV.	IV.	IV.	Cotton is perceptibly stained and silk dyed almost as deep as wool.	*Orange II is not so fast to light as Orange G G and is much inferior to the latter in respect to staining effect threads; still it is one of the most largely used orange acid colours for dark mode shades (Brown, Olive etc.) and is further used to a considerable extent for saddening Blacks and Dark Blues.* *Orange extra is a somewhat more concentrated brand.*
IV.	IV.	IV.	IV.	Same as with Orange II.	
IV.	IV.	IV.	IV.	Same as with Orange II.	*By reason of their great tinctorial power and very good fastness to rubbing these dyestuffs are used for the shading of dark colours.* *The chief brands are Orange EN and ENZ, which also possess the best fastness to light.*
IV.	IV.	IV.	IV.	Cotton is strongly stained and silk dyed almost as deep as wool.	
III. Turns redder.	III. Turns paler.	IV.	IV.	Same as with Orange II.	*Acid Brown and Acid Brown D approach Orange EN, ENZ and R in their behaviour with regard to levelling, but only come into consideration for dark brown and prune shades.*
II.	I—II.	IV.	On light steaming: IV. On severe steaming the shade turns duller: III.	Cotton is rather heavily stained, silk dyed almost as deep as wool.	

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Scarlet FR 1½ % 3 % 	With the addition of 10% bisulphate of soda, or 10% Glauber's salt and 4% sulphuric acid.	III.	III. The dyeings resist a light washing with neutral soap.	II. The dyeings resist a light milling fairly well.
Scarlet F2R 1½ % 3 % 		III.		
Scarlet F3R 1½ % 3 % 		III.		
Brilliant Scarlet 2R 1½ % 3 %		III—IV.		I—II.
Brilliant Scarlet 4R 1½ % 3 %		III—IV.	II—III. Not quite so good as Scarlet FR in respect to bleeding on to white wool.	
Crystal Scarlet 6R 1½ % 3 %		III.		

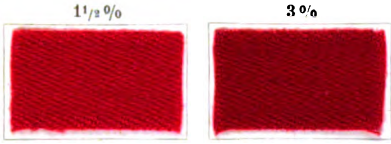
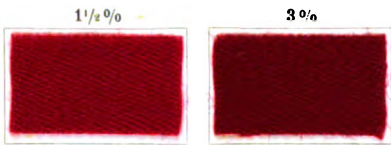
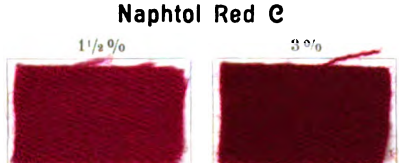
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	IV.	IV.	IV.		
IV.	IV.	IV.	IV.	Cotton and silk are not at all stained.	*Scarlet FR, F2R and F3R are extensively employed for the production of Scarlet shades on piece-goods and yarns and are also used largely in the flannel industry on account of their good fastness to stoving and washing.*
IV.	IV.	IV.	IV.		
IV.	II.	IV.	IV.	Cotton and silk are not at all stained.	*Amongst the red acid colours the Brilliant Scarlets take the lead and are distinguished from the above "F" brands by their greater brightness of shade and still better fastness to light.* *They are principally applied in the the dyeing of yarns and piece-goods.* *In addition to Brilliant Scarlet 2R and 4R the following important brands are known to the trade:* *Brilliant Scarlet GG* *" " G* *" " R* *" " 3R* *" " 6R* *The yellower brands Brilliant Scarlet GG and G are very fast to stoving; the "6R" behaves similarly to Crystal Scarlet 6R mentioned below.*
IV.	I.	IV.	IV.		
IV.	III.	IV.	IV.	Cotton is not stained and silk only slightly so.	*Crystal Scarlet 6R is distinguished for its particularly fine bluish cast and is used for yarns and also largely in the flannel and blanket industry.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Brilliant Cochineal 2R 1½ % 3 % 	Same as with Scarlet FR.	III—IV.	II—III. Same as with Brilliant Scarlet.	I—II. Same as with Brilliant Scarlet.
Brilliant Cochineal 4R 1½ % 3 % 		III.		
Brilliant Croceïne M 1½ % 3 % 		IV. The Brilliant Croceïnes belong to the best red wool colours in point of fastness to light.	III. Same as with Scarlet FR.	II. Same as with Scarlet FR.
Brilliant Croceïne 3B 1½ % 3 % 				
Brilliant Croceïne 7B 1½ % 3 % 				
Croceïne AZ 1½ % 3 % 		IV. Same as with Brilliant Croceïne.	III. Same as with Scarlet FR. Cotton however is tinted somewhat more.	II. Same as with Scarlet FR. Cotton however is tinted a little more.

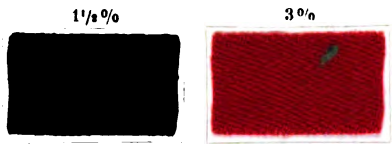
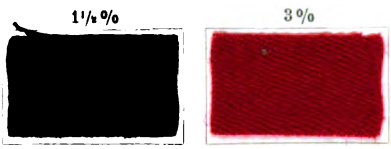
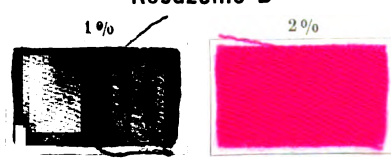
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	IV. Exceedingly good.	IV.	IV.	Cotton and silk remain untinted.	*Brilliant Cochineal 2R and 4R possess a bright bluish aspect very similar to that of Cochineal dyeings and are therefore considered important substitutes for Cochineal. They surpass the latter considerably in fastness to light, in their simpler method of working, and especially in their fastness to alkalies.*
IV.	IV. Exceedingly good.	IV.	IV.		*As they level more easily and also penetrate better than the Scarlet brands, they are frequently preferred to the latter, particularly for piece-goods.* *They are used for dyeing yarns and piece-goods, especially also woollen plush, flannel, cloth for facings, carpet yarns, as well as for felt caps (fezzes etc.) and hats.*
IV.	I.	IV.	On light steaming: IV. Strong steaming turns the shade somewhat yellower and duller: III.	Cotton is only very slightly stained, silk however being dyed same shade as wool.	*Principally on account of their excellent fastness to light, the Brilliant Croceïnes are extensively used for goods which in this respect are required to be of the very highest standard, such as fabrics for curtains and furniture, facings, carpet yarns, etc.* *Further brands possessing the same properties are: Brilliant Croceïne R, B, 2B, 5B, 6B and 9B as well as the very concentrated brands Brilliant Croceïne ROO, BOO and MOO.*
IV.	IV.	IV.			
IV.	I.	IV.	III—IV. Same as with Brilliant Croceïne.	Cotton is slightly stained, silk dyed the same depth as wool.	*Croceïne AZ resembles the Brilliant Croceïnes in its properties and method of application.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Scarlet EC 1½ % 3 % 	Same as with Scarlet FR.	II – III.	III. Same as with Crocein AZ.	II. Same as with Crocein AZ.
Roccelline 1½ % 3 % 		II – III.	II—III. Somewhat inferior to Scarlet EC.	I—II.
Azo Rubine A 1½ % 3 %		III—IV.	II—III. Same as with Roccelline.	I—II.
Azo Red A 1½ % 3 %		II—III.		
Amaranth 1½ % 3 %		III.		
Naphtol Red C 1½ % 3 % 		III.		

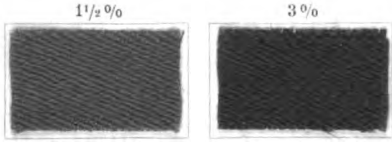
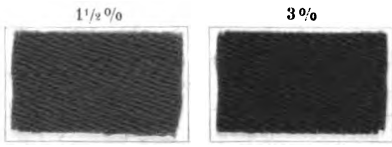
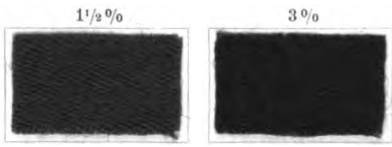
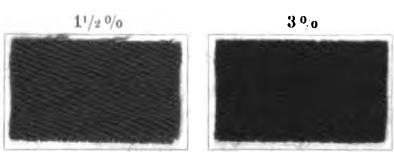
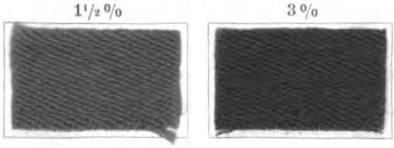
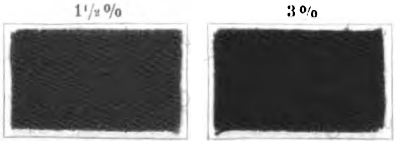
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	II--III. Turns yellower.	IV.	On light steaming: IV. On severe steaming the shade turns somewhat yellower: III.	Cotton is slightly stained and silk quite considerably.	*Scarlet E C is less bright than the aforementioned brands of Scarlet and is principally used for producing covered shades of Scarlet on piece-goods and yarns.*
IV.	III—IV. Turns somewhat yellower.	IV.	IV.	Cotton is perceptibly stained, silk being dyed almost as deep as wool.	*Roccelline by reason of its considerable tinctorial power is used for deep shades of Red and Claret, and is also of particular importance in silk dyeing.*
IV.	IV.	IV.	IV.	Cotton is not stained, silk only slightly so.	*These two dyestuffs are of the same importance for the production of claret and garnet shades in yarn and piece-dyeing, as the Scarlet brands are for producing scarlet shades.*
IV.	IV.	IV.	IV.	Cotton and silk remain untinted.	*Azo Red A has a somewhat brighter and more bluish cast than Azo Rubine A.*
IV.	I.	III—IV. Turns somewhat bluer.	IV.	Cotton and silk remain untinted.	*On account of their good covering power and their bluish cast, Amaranth and Naphtol Red C are largely used for claret and prune shades, as also as reddening agents for Browns.*
IV.	I.	III—IV. Turns somewhat bluer.	IV.	Cotton and silk remain perfectly untinted.	*The shades obtained with Naphtol Red C are a little brighter than those produced with Amaranth.* *Naphtol Red E B is a more yellowish brand possessing similar properties.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Milling Red G  	Commence dyeing with the addition of 10% Glauber's salt and 2—3% acetic acid and after 3/4 hour's boiling exhaust gradually by adding 2—4% acetic acid. In order to increase the fastness to milling, the goods may then be treated with chromium fluoride (in the case of Wool Red with bichromate of potash), as described for chrome colours.	II.	IV. The fastness to washing of Milling Red G is very good. The shade is not perceptibly altered, and white wool and cotton are not stained.	III Milling Red G resists severe milling sufficiently well. Even in severe milling white wool is not tinted and white cotton only slightly so; a subsequent chroming still further increases the fastness.
Milling Red FR  		III – IV.	III—IV. Almost equal to Milling Red G.	III. Similar to Milling Red G.
Wool Red BG 		III.	III—IV.	III. Bleeds a little more on to cotton than Milling Red G.
Wool Red B 		III – IV.	III—IV. Is slightly inferior to Milling Red BG.	III. Is slightly inferior to Wool Red BG.
Acid Magenta 	Same as with Scarlet FR.	I—II.	I—II.	I.
Rosazeïne B  	With the addition of 10% Glauber's salt and 5% acetic acid, or same as with Scarlet FR.	II.	III—IV. The dyeings withstand a neutral washing well.	III. The dyeings resist a light or medium milling sufficiently well.

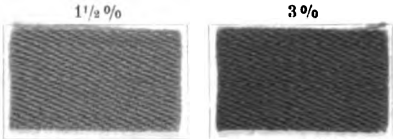
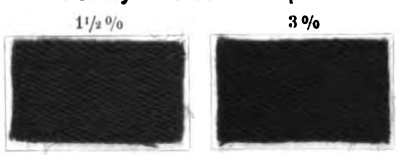
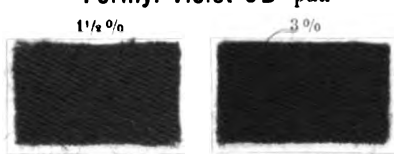
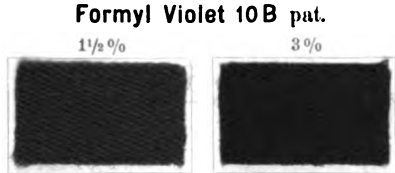
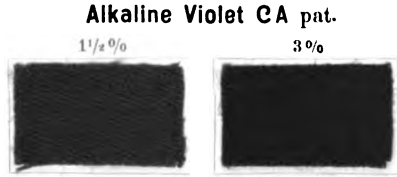
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	III—IV. Turns a little yellower.	IV.	IV.	Cotton is not stained; silk is dyed to about the same extent as wool.	*Milling Red G belongs to the red acid colours fastest to washing and milling, and serves for the dyeing of loose wool, slubbing, noils, and effect yarns fast to milling and stoving. Milling Red G is used in combination with Rosazeine B for the production of specially bright tones of Scarlet, and shaded with Milling Yellow O for producing orange shades In order to increase their fastness to milling, the dyeings may be aftertreated with chromium fluoride; bichromate of potash also increases the fastness to milling, but dulls the shade a little.*
IV.	II—III. Turns yellower.	IV.	IV.	Cotton ist not stained, silk considerably.	*Milling Red FR is applied similarly to the "G" brand.* *Milling Red FGG and R are two further brands of similar properties, the former being yellower and the latter bluer in shade.*
IV.	III. Turns somewhat duller and yellower.	IV.	IV.	Cotton is only slightly stained, silk however being dyed almost as deep a shade as wool.	*Wool Red B G and B are distinguished for very good fastness to milling, particularly along with white wool, and also for very good fastness to light; they are used to a large extent for self colours and also for shading Anthracene Colours for loose wool, slubbing, yarn, etc. They are also used on piece-goods for the production of red and claret shades fast to washing and water.*
IV.	II—III. Turns duller.	IV.	IV.	Cotton is perceptibly stained and silk dyed almost as deep a shade as wool.	
I. Loses in colour.	I.	IV. After neutralising, the goods should if necessary be again lightly acidulated.	IV.	Cotton is not stained and silk only slightly so.	*Acid Magenta levels exceedingly well, and its dyeings are distinguished for their great brightness of shade.* *On account of its comparatively inferior fastness, the product is only used for particularly bright shades, while for compound shades our considerably faster substitutes such as Lanafuchsine, Azo Wool Violet and similar products are given the preference.*
IV.	IV.	IV.	IV.	Cotton is only slightly stained, silk on the other hand being dyed as deep a shade as wool.	*Rosazeine B is distinguished for its brilliant shade and serves in the first place for the production of bright Pinks and for the brightening of Reds and Oranges.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Lanafuchsine SG 1½ % 3 % 	Same as with Scarlet FR.	III—IV.	II—III. The dyeings resist a light washing fairly well.	I—II.
Lanafuchsine SB 1½ % 3 % 		III.		
Lanafuchsine 6B 1½ % 3 % 		III—IV.	III. The dyeings resist a light or medium washing very well.	II. The dyeings resist a light neutral milling.
Azo Orseille BB 1½ % 3 % 		III.	II—III. Same as with Lanafuchsine SG.	I—II.
Archil Substitute N powder 1½ % 3 % 		II—III.	II—III. Same as with Lanafuchsine SG.	I—II.
Brilliant Orseille C pat. 1½ % 3 % 		II.	II—III. Same as with Lanafuchsine SG.	I—II.

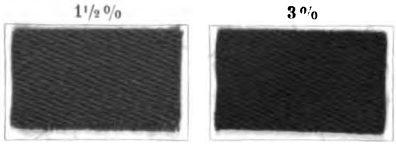
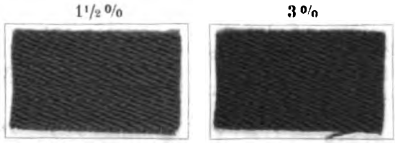
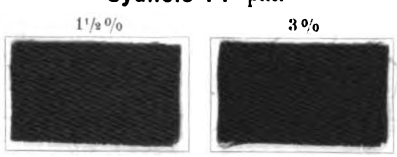
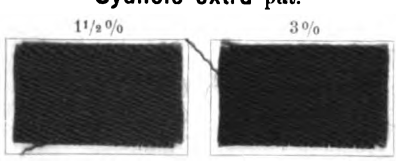
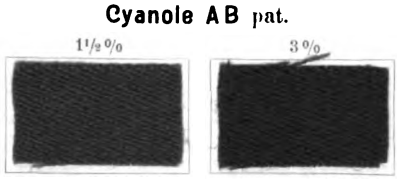
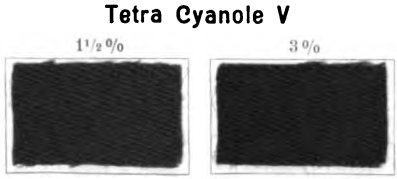
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	IV.	IV.	IV.	Cotton and silk are not stained.	*Lanafuchsine S G and S B are amongst the most important of the easily levelling dyestuffs; they possess very good fastness to light and alkalies, dye excellently level, and are largely used for compound shades of all kinds, as well as for direct Reds and Clarets.*
IV.	IV.	IV.	IV.		*In the dyeing of compound shades, Lanafuchsine S G serves principally for shading Browns and dark mode shades, whereas S B is used principally for light and medium mode shades.*
II.	IV.	III—IV. Turns somewhat bluer.	IV.	Cotton remains perfectly white, and silk is only very slightly stained.	*Lanafuchsine 6 B is similar in shade to Acid Magenta, but is distinguished from the latter by its considerably better fastness to washing and alkalies, as well as for its excellent fastness to light and stoving. The dyestuff serves principally for the production of bright Clarets and similar shades, and, in combination with Cyanole Green and Cyanole Fast Green, for producing Blues and Navies.*
IV.	IV.	III—IV. Turns somewhat bluer.	IV.	Cotton is not stained and silk only slightly so.	*Azo Orseille B B levels particularly well and serves principally as a reddening agent for light mode shades.*
III.	I.	III—IV. Turns somewhat bluer.	IV.	Cotton and silk are not stained.	*Archil Substitute is used in place of Azo Orseille for levelling purposes. It is also sold in paste form as Archil Substitute N paste and I extra paste.*
IV.	IV.	III—IV. Turns somewhat bluer.	IV.	Cotton is not stained, silk only slightly so.	*Brilliant Orseille possesses the same levelling properties as Archil Substitute, but dyes a considerably brighter shade than the latter.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Acid Violet 4RS 1½ % 3 % 	With the addition of 10—15% bisulphate of soda, or 10% Glauber's salt and 4—5% sulphuric acid.	I—II.	I—II. The shade turns considerably paler, but partly returns on souring off.	I.
Azo Wool Violet 7R 1½ % 3 % 		III—IV.	II—III. Same as with Lanafuchsine SG.	I—II. Same as with Lanafuchsine SG.
Formyl Violet S4B pat. 1½ % 3 % 	With the addition of 5—10% bisulphate of soda or 10% Glauber's salt and 2—4% sulphuric acid; or, commencing with 10% Glauber's salt and 5% acetic acid, and exhausting the bath by further adding 3—5% bisulphate of soda.	I—II.	IV. The dyeings are exceedingly fast to washing and water.	III. The dyeings resist even a severe milling. The blue brands are slightly inferior to the reddish ones.
Formyl Violet 6B pat. 1½ % 3 % 				
Formyl Violet 10B pat. 1½ % 3 % 				
Alkaline Violet CA pat. 1½ % 3 % 	With the addition of 10% Glauber's salt and 5% acetic acid, or neutral with only Glauber's salt, or alkaline like Alkaline Blue.	I—II.	IV. Not quite so good as Formyl Violet.	III. Not quite so good as Formyl Violet

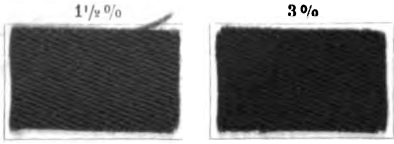
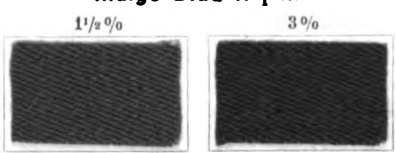
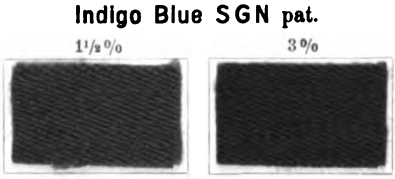
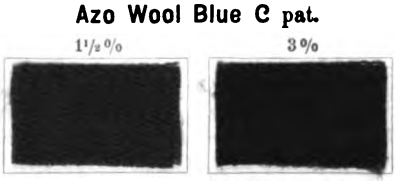
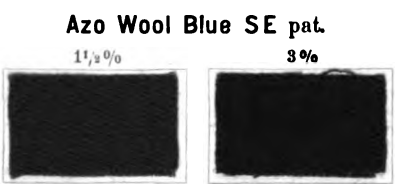
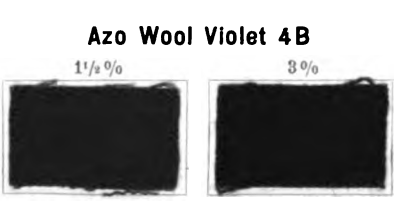
Colours

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
I.	I—II.	II—III. Turns duller and bluer.	On light steaming: IV. By severe steaming the shade becomes slightly duller: III.	Cotton is not stained, silk tinted slightly bluish.	*Acid Violet 4RS is especially distinguished for its clearness of shade and very good levelling power.*
IV.	IV.	III—IV. Turns somewhat bluer.	IV.	Cotton is not stained, silk only very slightly so.	*Azo Wool Violet 7R possesses very good levelling power, as well as excellent fastness to light, alkalies and stoving, and is largely used for the production of violet, claret, prune and blue shades on yarn and piece-goods.*
IV.	IV.	IV.	IV.	Cotton is not stained, but silk is dyed as deep a shade as wool.	*Compared with the ordinary Acid Violets the Formyl Violets are vastly superior in point of fastness to washing, milling, alkalies and water. They resist even a severe milling and are therefore extensively used as self colours and also in combination with other dyestuffs fast to milling for producing dyeings fast to milling, washing and water on loose wool, slubbing, shoddy, knitting or effect yarns. They are also used for piece-goods; here they are for instance applied largely in combination with Naphtol Black for producing the so-called "Brilliant Blue"; in half-wool dyeing they are very important products by reason of their property of dyeing well in a neutral bath.*
IV.	III—IV. Turns a little redder.	IV.	IV.		
IV.	III. Turns a little redder.	IV.	IV.		*Other brands are: Formyl Violet S5B pat. which is a little bluer than the S4B, and Formyl Violet 8B pat. which in shade stands between 6B and 10B.*
IV.	IV.	IV.	IV.	Cotton is only slightly stained and silk dyed as deep a shade as wool.	*Alkaline Violet CA possesses nearly equal fastness to Formyl Violet S4B and may be dyed in an alkaline bath, which is not the case with Formyl Violet S4B. It is largely used for shading Alkaline Blue and for brightening Logwood Blue, particularly for half-wool and shoddy dyeing. Another more concentrated brand is Alkaline Violet C pat.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Acid Violet 6BS 1½% 3% 	With the addition of 10—15% bisulphate of soda, or 10% Glauber's salt and 4—5% sulphuric acid.	I—II.	III. The dyeings resist a neutral washing very well.	II.
Formyl Blue B pat. 1½% 3% 	Same as with Formyl Violet, page 28.	II.	IV. The dyeings are excellently fast to washing and water.	III. The dyeings resist even a severe milling very satisfactorily. In the case of severe alkaline milling it is of advantage to acidulate with some acetic acid after rinsing.
Cyanole FF pat. 1½% 3% 	With the addition of 10—15% bisulphate of soda, or 10% Glauber's salt and 4—5% sulphuric acid.	II—III.	II - III. The dyeings resist a light neutral washing.	I—II.
Cyanole extra pat. 1½% 3% 		II—III.		
Cyanole AB pat. 1½% 3% 		II—III. Somewhat inferior to Cyanole FF and Cyanole extra.		
Tetra Cyanole V 1½% 3% 		II—III.	III. The dyeings resist a neutral washing very satisfactorily.	I—II.

Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
II—III. The shade becomes paler by strong alkalies, but returns completely on acidulating.	IV.	IV.	IV.	Cotton is not stained, but silk is dyed as deep a shade as wool.	*Acid Violet 6BS levels very well and is used for the production of violet shades and also as a shading product for Blues on piece-goods and yarns.* *Another brand is Acid Violet 6BC which is distinguished from the 6BS principally by its good fastness to alkalies.*
IV. Turns more violet.	IV.	IV.	IV.	Cotton is not stained, but silk is dyed as deep a shade as wool.	*Formyl Blue B in its behaviour and in its fastness is closely allied to Formyl Violet and on account of its bright blue shade is used for producing Blues fast to washing, milling and water, as well as for the brightening of Blues produced with Anthracene Chrome Colours. The dyestuff is also of special importance for half-wool dyeing, as it dyes well in a neutral bath.*
IV. Turns somewhat duller.	IV.	IV.	IV.	Cotton is not stained, silk however in a strong sulphuric acid bath is dyed almost as deep a shade as wool.	*The various brands of Cyanole are distinguished for their exceedingly good levelling property, very good fastness to hot ironing and rubbing, and fastness to alkaline mud off the street. They also possess the property of hardly changing in artificial light.* *In the piece- and yarn-dyeing industries these products are extensively used both as self colours and as easily levelling shading colours for blue, prune, olive and compound shades.* *Particularly pure shades are obtained with Cyanole FF; it is used mainly for bright Blues in place of Alkaline Blue and Victoria Blue which it surpasses in fastness to alkalies and light.* *Further brands are:* *Cyanole GG pat. Cyanole BN pat.* *„ C „ „ BB „* *„ V „ „ BSB „* *„ VN „ „ extra H „*
	IV.	IV.	IV.		
IV.	IV.	IV.	IV.	Cotton is not stained, but silk is dyed almost as deep a shade as wool.	*Tetra Cyanole V possesses the same excellent fastness and levelling power as Cyanole.* *It is very extensively used for producing bright, greenish shades of Blue and also as an easily levelling saddening agent for compound shades of all kinds in the dyeing of yarns and piece-goods.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Thiocarmine R powder 1½ % 3 % 	Same as with Cyanole.	I.	III. The dyeings resist a neutral washing very well.	II—III. The dyeings resist a light or medium milling very well.
Indigo Blue N pat. 1½ % 3 % 		I—II.	II—III. A little better than the Cyanole brands.	I—II.
Indigo Blue SGN pat. 1½ % 3 % 		I—II. Not quite so good as that of the "N" brand.	II—III. Behaves a little better than the "N" brand.	I—II.
Azo Wool Blue C pat. 1½ % 3 % 		I—II.	II—III. Same as with Cyanole extra.	I—II.
Azo Wool Blue SE pat. 1½ % 3 % 		II—III.	II—III. Same as with Cyanole extra.	I—II.
Azo Wool Violet 4B 1½ % 3 % 		II—III.	II—III. Same as with Cyanole extra.	I—II.

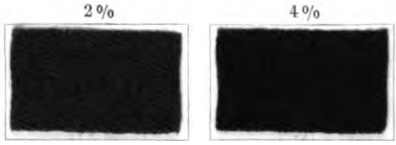
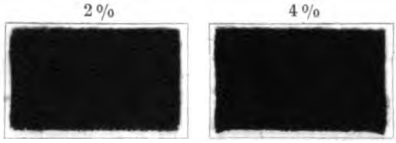
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	II. Turns paler and greener.	IV.	IV. On severe steaming the shade turns greener. III.	Cotton is not stained, silk is dyed as much as wool.	*On account of its good fastness to washing and milling, Thiocarmine R is principally used for knitting yarns and for articles required to stand a light milling.* *It is sold both in powder and paste form.*
III—IV. Turns a little paler.	III. Turns paler.	IV.	IV.	Cotton is not stained, silk is dyed about as deep a shade as wool.	*Indigo Blue N levels well and serves as a cheap saddening agent for compound shades.*
III. Turns somewhat paler and more purple.	II—III. Turns brighter and more purple.	IV.	IV.	Cotton is not stained, but silk is tinged distinctly bluish violet.	*Being very cheap, Indigo Blue SGN serves principally for the production of full shades of medium Blue and Navy Blue.*
II. Turns considerably paler.	IV.	IV. Rinsed only with water it becomes more reddish, neutralised with soda on the other hand it assumes its original shade.	IV.	Cotton and silk remain completely untinted.	*Azo Wool Blue C possesses the valuable property of yielding a pure white on discharging with zinc dust, Hyraldite or tin crystals, and on this account it is largely used for producing discharge effects on woollen piece-goods, yarns, woollen plush, etc.* *The dyestuff is also largely used for ladies' dress cloths with white silk effect threads.*
IV.	IV.	IV.	IV.	Cotton is not stained, silk being tinted light green.	*Azo Wool Blue SE is an easily levelling Blue and therefore exceedingly well adapted for the production of dark blue and navy blue shades; the colour is also distinguished for its good fastness to light, alkalies and rubbing.* *Azo Wool Blue B is applied in a like manner, but is not so fast to acids as SE.*
IV.	IV.	IV. Turns a trace more bluish.	IV.	Cotton is not stained, silk assuming a pale blue tint.	*Azo Wool Violet 4B levels very well and surpasses the ordinary Acid Violets in fastness to light, rubbing and alkalies and in not altering its shade in artificial light.* *Besides for violet and prune shades it is largely used also in combination with Azo Wool Blue SE, Cyanole Green or Cyanole Fast Green for navy and dark blue shades.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Peri Wool Blue G pat. 2% 4% 	Commence dyeing with the addition of 25% Glauber's salt and 10% bisulphate of soda, or 30% Glauber's salt and 4% sulphuric acid at about 60° C. (140° F.), raise to boiling temperature in ¾ hour, after 1 hour's boiling add 5% bisulphate of soda or 2% sulphuric acid, and boil hard for another ½ hour. The levelness of the dyeings is much promoted by severe boiling.	IV. Not quite so good as that of the B brand.	III. The dyeings resist a neutral washing well.	II. The dyeings resist a light milling.
Peri Wool Blue BG pat. 2% 4% 		IV. Same as with the G brand.		
Peri Wool Blue B pat. 2% 4% 		IV. Exceedingly good.		
Azo Merino Blue 3B pat. 2% 4% 	Commence dyeing handwarm with the addition of 20% Glauber's salt and 10% bisulphate of soda, or 25% Glauber's salt and 4% sulphuric acid, raise to the boil in 1 hour, after 1 hour's boiling add 5% bisulphate of soda or 2% sulphuric acid, and boil for another 20—30 minutes. In the case of goods which are difficult to dye level, dyeing is best commenced with the addition of 20% Glauber's salt and 5% acetic acid, and after ¾ hour's boiling the bath is gradually exhausted by adding bisulphate of soda.	III.	II—III. The dyeings withstand a light neutral washing.	I - II.
Azo Merino Blue G pat. 2% 4% 		III.		
Azo Merino Dark Blue R pat. 2% 4% 		III. Not quite so good as the 3B and G brands.		

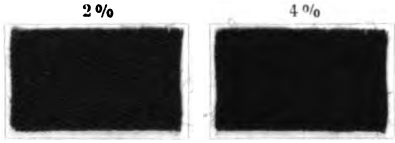
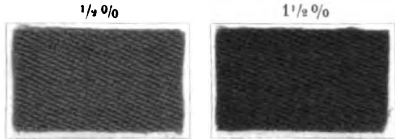
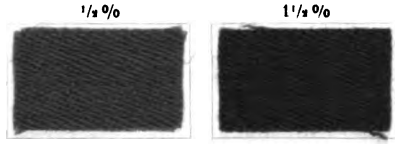
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV	III. Turns redder.	III. Turns redder.	IV.		*Peri Wool Blue B belongs to the fastest blue acid colours in respect to fastness to light and is extensively used for the production of dark blue shades, particularly on better-class gentlemen's suitings (plain goods and goods with cotton effect threads), cloths for carriages and furniture, as well as for carpet yarns.*
					The dyeings are fast to rubbing and meet all ordinary requirements of the piece-goods trade in respect to fastness to steaming, hot ironing, alkalies and perspiration.
IV.	I.	III. Same as with the G brand.	On light steaming: IV. Severe steaming turns the shade redder: III.	Cotton is not stained, silk only slightly so.	*Peri Wool Blue B dyes a more violetish and the BG and G brands a more greenish blue tone, so that by mixing the brands the greatest variety of navy blue shades may easily be obtained.*
					Peri Wool Blue G is also suited for the production of dark green tones in combination with Acid Yellow AT and Cyanole fast Green or Cyanole Green.
IV.	I.	III. Same as with the G brand.			*The B brand levels particularly well.*
					The following products are best adapted for shading Peri Wool Blue in a boiling bath: Cyanole extra, Cyanole Fast Green G, Orange GG, Acid Yellow AT and Azo Orseille BB.
IV.	II.	IV.	IV.		*Azo Merino Blue and Azo Merino Dark Blue are used in the first place for the dyeing of cheaper kinds of gentlemen's suitings and for plain goods (cheviots etc.), particularly those containing cotton effect threads.*
					The dyestuffs level well and are especially distinguished for their property of retaining their fine shade in artificial light and not becoming reddish or brownish.
IV.	II.	IV.	IV.	Cotton is not stained, silk is only slightly stained (especially on dyeing in a bath acidulated with acetic acid).	*Particularly covered shades are obtained with Azo Merino Dark Blue R which therefore comes into consideration for dark Blues.*
					For shading in a boiling bath the same easily levelling dyestuffs recommended above for Peri Wool Blue come into consideration.
IV.	II–III.	IV.	IV.		

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Lanacyl Blue BB pat. 2% 4% 	Start dyeing handwarm with the addition of 20% Glauber's salt and 10% acetic acid, raise to the boil within 1 hour, and boil for a full hour. With goods or yarns containing **dead fibres** or **kemps** it is best to boil the bath vehemently; the dyeing of such hairs is also improved by adding 5% acetic acid or some bisulphate of soda after the dyeing has proceeded for some time.	IV. Similar to Peri Wool Blue G.	III.	II.
Lanacyl Blue R pat. 2% 4% 		IV.		
Lanacyl Violet B pat. 2% 4% 		IV. Not quite so good as Lanacyl Blue BB.		
Lanacyl Navy Blue BB pat. 2% 4% 	Dyed as stated for Lanacyl Blue, adding however 5% bisulphate of soda when the bath is exhausted, and boiling then for 20 minutes in order to completely fix the shades.	III. Somewhat better than B.	III.	II.
Lanacyl Navy Blue B pat. 2% 4% 		III		
Naphtol Blue G pat. 2% 4% 		III.	II—III. The dyeings resist a light neutral washing.	I—II.

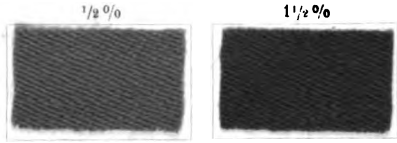
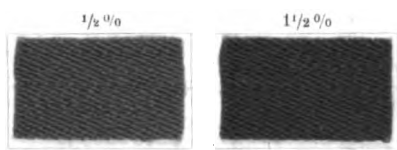
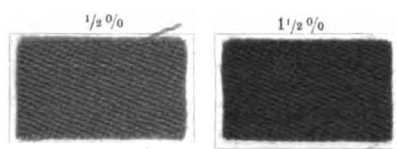
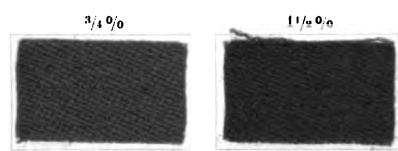
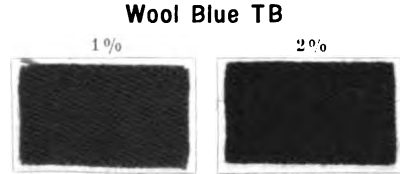
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	I.	III–IV. Turns somewhat redder.	On light steaming: IV. On severe steaming: I – II.	Cotton is not stained and silk only slightly so.	*Lanacyl Blue BB and R possess approximately the same good fastness to light as Peri Wool Blue and are applied in the same manner on piece-goods and yarns. They are further used for dyeing navy blues on blankets and coarse woollen materials which are milled with fullers earth, as well as for knitting and hosiery yarns.*
IV.	I.	III–IV. Turns somewhat redder.			*Lanacyl Blue BB shows a bright greenish blue shade, and the R brand a bright purple blue which are not at all changed in artificial light.* *For dyeing dark navy blue shades, the products may be saddened with Orange GG, II or Acid Yellow AT, or be used in combination with Lanacyl Navy Blue or Naphtol Blue.* *For shading in a boiling bath, the same easily levelling dyestuffs come into considertion as for Peri Wool Blue.*
IV.	II.	IV.	On light steaming: IV. On severe steaming: III.	Same as with Lanacyl Blue.	*Lanacyl Violet is principally used for shading Lanacyl Blue and Lanacyl Navy Blue for very reddish blues; it is also very serviceable in combination with Acid Yellow AT, Orange GG and Azo Rubine A for producing reddish brown and prune shades.*
IV.	II.	IV.	IV.	Cotton is not stained, silk on the other hand perceptibly so.	*Lanacyl Navy Blue BB and B possess great tinctorial power, full shades of navy blue being obtained already with about 3% colour.* *They are principally used for cheap gentlemens' suitings and yarns, and are also important shading products for dyeing unions.* *Lanacyl Navy Blue BB dyes rather bluer and brighter shades than B.*
IV.	II.	IV.	IV.		
IV.	IV.	IV.	IV.	Cotton is stained slightly greenish blue, silk is noticeably tinted.	*Naphtol Blue G appears violet-blue in reflected light, and in transmitted light it has the greenish blue appearance of Indigo; it is therefore used on piece-goods and yarns for producing deep Indigo shades, both as a self colour and in combination with the Lanacyl Colours.* *Another brand is Naphtol Blue R, which possesses a more violetish shade but otherwise has the same properties as G.*

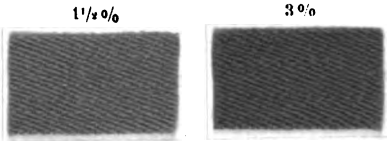
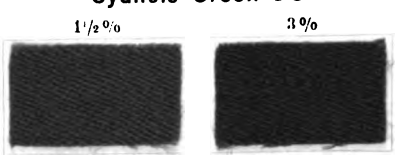
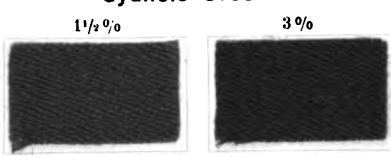
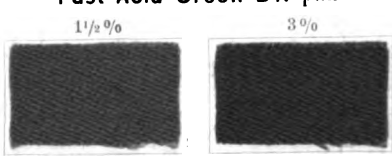
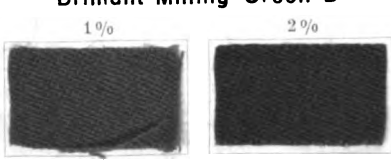
Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Solid Blue R 2 % 4 % 		II - III.	III. The dyeings resist a neutral washing, the R brand is not quite so good as 3 R in this respect.	II. The dyeings resist a light milling; R is not quite so good as 3 R in this respect.
Solid Blue 3 R 2 % 4 % 		II – III. Not quite so good as R.		
Induline B 1/2 % 1 1/2 % 	With the addition of 10% bisulphate of soda, or 10% Glauber's salt and 4% sulphuric acid. It is best to enter the goods handwarm, raise to the boil in the course of 3/4 hour, and to boil severely for about 1 1/4 hours.	II.		
Silver Grey N 1/2 % 1 1/2 % 		II III.		
Nigrosine soluble in water 1/2 % 1 1/2 % 		II.	I–II.	I.
Aniline Grey B 1/2 % 1 1/2 % 		II. Not quite so good as Induline and Nigrosine.		

Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	IV.	IV.	IV.	Cotton is perceptibly stained, silk is dyed as deep a shade as wool.	*Solid Blue is almost entirely replaced by the considerably faster Lanacyl Colours, Peri Wool Blue, etc. and is now used principally in combination with Logwood for cheap piece-goods (shoddy etc.) and for navy blues on mixed fabrics composed of wool and silk.*
IV.	IV.	IV.	IV.		*It is on the other hand largely used in wool printing and silk dyeing.*
					*A more greenish brand with similar properties is **Solid Blue 6 G.***
II. Turns redder.	IV.	IV.	IV.		
II. Turns redder.	IV.	IV	IV.	Cotton is perceptibly stained, whereas silk is dyed a deeper shade than wool.	*These products yield grey shades with medium fastness to light.*
					For woollen goods they are now of minor importance; in some districts they are used for yarns.
II—III. Turns redder.	IV.	IV.	IV.		*Their principal field of application is for silk dyeing and for inks and similar preparations.*
					Other brands of similar properties are: *Induline 2B and 3B* *Nigrosine I—IV* *Aniline Grey R.*
II—III. Turns redder.	IV.	IV.	IV.		

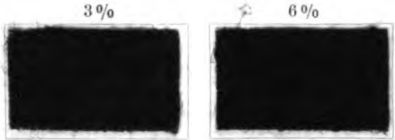
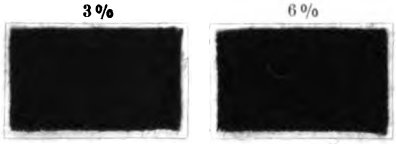
Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Alkaline Blue 6B 1/2 % 1 1/2 % 	Commence dyeing with the addition of 1—2% soda or 3—6% borax at about 60° C. (140° F.), raise to 90° C. (195° F.) in 20 minutes, and dye at this temperature for about 3/4 hour. Then rinse, and sour off with sulphuric acid in a bath of 60—70° C. (140—160 deg. F.)	III.	III—IV. The shade becomes a good deal lighter on washing, but returns on acidulating.	III. The dyeings resist a rather severe milling. After rinsing, the goods must be acidulated.
Alkaline Blue 3B 1/2 % 1 1/2 % 		III.		
Alkaline Blue 2R 1 % 2 % 		III. Not quite so good as 6B and 3B.		
Water Blue B 1/2 % 1 1/2 % 	With the addition of 10% bisulphate of soda, or 10% Glauber's salt and 4% sulphuric acid. As the dyestuffs exhaust rapidly, the temperature must only gradually be raised to the boil.	II—III.	III—IV. Not quite so fast as Alkaline Blue. The goods must be acidulated after rinsing.	II—III. Not quite equal to Alkaline Blue. After rinsing, the goods must be acidulated.
Water Blue RB 3/4 % 1 1/2 % 		II—III. Not quite so good as B.		
Wool Blue TB 1 % 2 % 		II.		

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
I. Decolourised.	IV.	III—IV. Becomes a little lighter in shade.	IV. On severe steaming the shade becomes more reddish.	Cotton is perceptibly stained, silk being dyed as deep a shade as wool.	*Alkaline Blue yields very bright blue shades of good fastness to light, water, washing, milling and stoving.* *It is extensively used for the production of bright Blues in piece- and yarn-dyeing, particularly for zephirs and effect yarns, and also as a shading product for unions.* *Other important brands are:* ***Alkaline Blue 5B, 4B, 2B, B, R and 3R.***
I. Decolourised.	II.	III—IV. Turns somewhat paler.	IV.		*On account of their bright shades and great tinctorial power the various brands of Water Blue and Wool Blue TB are largely used in shoddy dyeing.*
I. Decolourised.	II.	III—IV. Turns somewhat paler.	IV.		*They are also used to a considerable extent for the brightening of Logwood, either in the mordanting bath, or together with Logwood in the dyebath, a little acetic or sulphuric acid being added after some boiling.* *In addition to these three principal brands the following are used:* ***Water Blue R*** ***„ „ No. 225*** ***Pure Soluble Blue*** ***Blue SCS*** ***Navy Blue RSC.***
II. Becomes considerably redder.	III. Becomes a little lighter in shade.	IV.	IV.		

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Acid Green extra conc. 		II.	III. The shade looses considerably during the washing but returns on acidulating.	II.
Cyanole Fast Green G pat.		III.	III IV. Cyanole Fast Green resists even severe washing very well.	II –III. The dyeings resist also a medium milling very well.
Cyanole Green 6G 	With the addition of 10—15% bisulphate of soda, or 10% Glauber's salt and 4—6% sulphuric acid.	III. Somewhat better than Cyanole Green B.	II—III. The dyeings resist a light neutral washing.	I—II.
Cyanole Green B 		III.		
Fast Acid Green BN pat. 		II– III.	II – III. Not quite equal to Cyanole Green.	I—II.
Brilliant Milling Green B 	Same as for Acid Green, or with the addition of 10% Glauber's salt and 5% acetic acid, or with subsequent chroming or on a chrome mordant.	II.	IV. The fastness to washing is very good. On severe alkaline washing it is well to acidulate after rinsing.	III The dyeings resist even a severe milling sufficiently well. In case of a severe alkaline treatment the goods should be acidulated after rinsing.

Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
I. Becomes decolourised.	II.	IV.	IV.	Cotton is not stained, but silk is dyed almost as deep a shade as wool.	*Acid Green levels very well and on account of its clear shade is principally used for the production of bright Greens on piece-goods and yarns. It is also used as a cheap saddening product for blue and compound shades.* *In addition to Acid Green extra conc. the following brands are known to the trade:* *Acid Green extra conc. B — Acid Green No. 745* *„ „ 5 G — „ „ liquid 40%* *„ „ H — „ „ liquid 200% conc.* *Of these, Acid Green extra conc. B dyes bluer, 5 G more yellowish shades than Acid Green extra conc., while the other brands differ from the latter only in tinctorial power.*
IV.	IV.	IV.	IV.	Cotton is not stained, but silk is dyed as deep a shade as wool.	*Cyanole Fast Green G possesses almost the same brightness as Acid Green, but differs from the latter in its excellent fastness to alkalies and stoving and considerably better fastness to light and washing.* *In its levelling properties it is also superior to Acid Green. For the dyeing of piece-goods and yarns it is of excellent value. It is used in the first place for producing bright Greens fast to alkalies (billiard cloth) and for Olives, dark compound shades, and Browns.* *It is further used in combination with Azo Wool Violet, Acid Violet or Cyanole for producing Navy Blues of very good fastness to alkalies, light and rubbing.*
III—IV. The shade becomes a little bluer.	IV.	IV.	IV.	Cotton is not stained, silk however is tinted perceptibly.	*By reason of its excellent levelling property and its good fastness, Cyanole Green belongs to the most important of the easily levelling dyestuffs and is used extensively in combination with Acid Yellow, Tropaeoline, Orange, Lanafuchsine and Azo Orseille for producing all kinds of mode shades, Greens, Olives and Browns on ladies' and gentlemen's dress goods, upholstery materials, and yarns.* *It is also extensively used for shading Anthracene Colours; the fastness to light and washing are still further increased by chroming.* *A somewhat duller brand is Cyanole Green S.*
II—III. Becomes bluer and lighter.	II.	IV.	IV.	Cotton is not stained, but silk is dyed about as deep a shade as wool.	*Fast Acid Green BN is somewhat brighter in shade than Cyanole Green and is used for Greens and also as an easily levelling shading product for Olives and Browns.* *Another brand is Fast Acid Green BN which is somewhat bluer in shade than Fast Acid Green BN and a little inferior in fastness to light.*
III. By a severe treatment with alkalies the shade becomes lighter but returns completely on acidulating.	IV.	IV.	IV.	Cotton is very slightly stained, but silk is covered excellently.	*Brilliant Milling Green B dyes a very bright shade and is exceedingly fast to washing, milling and water. It is largely employed for producing bright Greens fast to milling and for shading and brightening Anthracene Colours on loose wool, slubbing, noils and yarns. It is largely used also in piece-dyeing, particularly for the dyeing and brightening of green cloth for facings, and for shading Blacks.* *Brilliant Milling Green can without affecting its shade be subsequently chromed or dyed on a chrome mordant.* *Brilliant Milling Green is also largely used in printing wool and slubbing.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Naphtol Green B 3 % 6 % 	Enter with the addition of 20 % Glauber's salt and 5—10 % bisulphate of soda at 60° C. (140° F.), raise to the boil within ¾ hour, and when the bath is exhausted add further 5 % bisulphate of soda and boil for another 20 minutes.	IV. The fastness to light is exceedingly good.	III IV. The dyeings resist even severe washing.	II—III. The dyeings resist a light to medium milling.
Naphtol Black B 3 % 6 % 	For Black: Enter at 60—70° C. (140—160° F.) with the addition of 10 % Glauber's salt and 10 % bisulphate of soda, or 20 % Glauber's salt and 4 % sulphuric acid, raise to the boil in the course of about 20 minutes, and boil for 1 hour. Then add some more bisulphate of soda or sulphuric acid in order to completely exhaust the bath, and boil for another 20 minutes. Dark blue shades are dyed as stated for Naphtol Blue on page 36.	IV.	II—III. The dyeings resist a light neutral washing.	I—II.
Naphtol Black 3B 3 % 6 % 				
Naphtol Black 6B 3 % 6 % 				
Naphtol Black SG 3 % 6 % 				
Naphtol Blue Black S2B pat. 3 % 6 % 		IV.	II III. Similar to Naphtol Black.	I—II.

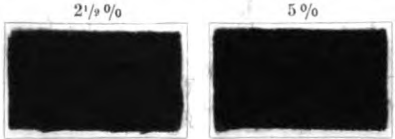
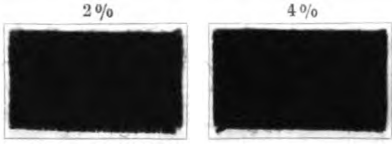
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	III - IV. Becomes a little lighter.	IV.	On light steaming IV. On severe steaming I—II.	Cotton is stained very slightly yellowish, but silk is not tinted.	*Naphtol Green B possesses exceedingly good fastness to light and in this respect cannot be equalled by any other green dyestuff. It is used for the production of Greens fast to light, Russian Greens and Olives on white materials and goods previously bottomed with Indigo, and is further largely applied for dyeing carpet yarns. For shading, Orange G G, Acid Yellow A T, Cyanole, Cyanole Fast Green, and for saddening, Naphtol Blue G and Naphtol Blue Black, are principally used.*
IV.	IV.	IV.	IV.	Cotton remains perfectly untinted. Silk is only slightly stained and is easily rendered perfectly white by suitable cleaning.	*The dyestuffs of the Naphtol Black group, which were the first black acid dyestuffs in the market, are distinguished for their exceedingly good fastness to light and air, and by very good fastness to rubbing, steaming, carbonising and stoving.* *The various brands of Naphtol Black are extensively used in the dyeing of piece-goods and yarns, particularly also for materials containing cotton and silk effect threads which are intended to remain undyed.* *In addition to their application for producing Blacks, they are used — especially the 3 B and 6 B — in combination with Formyl Violet for producing navy blues and dark blues (so-called "Brilliant Blue").* *Naphtol Black B is the reddest brand and 6 B the brand with the most bluish cast; S G possesses great covering power and is therefore chiefly used for jet blacks.* *Further brands with the same properties are: **Naphtol Black 2 B, M and P.*** *For wool printing, **Naphtol Black B D** and **Naphtol Black B D F** have proved of excellent service.*
IV.	IV.	IV.	IV.	Same as with Naphtol Black.	*Naphtol Blue Black S 2 B possesses properties similar to Naphtol Black and is used in a like manner; in shade it corresponds with Naphtol Black 3 B.* *Further brands are: **Naphtol Blue Black S B, S 3 B and 6 B.*** *Of these brands, S B has the shade of Naphtol Black B, Naphtol Blue Black S 3 B that of Naphtol Black 6 B; Naphtol Blue Black 6 B dyes a much more bluish shade of black and has a greater tinctorial power than the other brands.*

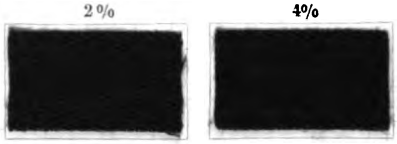
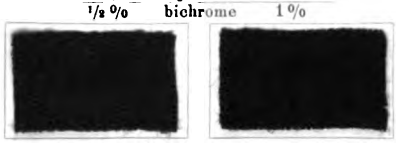
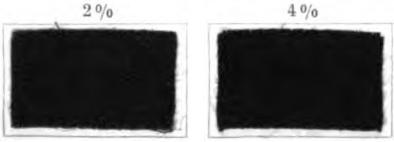
Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Naphtylamine Black 4B pat. 2 % 4 % 	Commence dyeing with the addition of 10% Glauber's salt and 5% acetic acid at about 70° C. (160° F.), raise in about 20 minutes to boiling temperature; after boiling for ¾ hour, add 5—7% bisulphate of soda or 2—2½ % sulphuric acid well diluted with cold water, and boil for another 20 minutes until the bath is completely exhausted. Note: The dyeing may also be commenced straightaway with bisulphate of soda or sulphuric acid, but the Black then turns out somewhat less bloomy than when dyeing is commenced with acetic acid. In such case commence with the addition of 10% Glauber's salt and 3—5% bisulphate of soda, or 15% Glauber's salt and 1½—2% sulphuric acid, and after boiling for about ¾ hour exhaust the bath by adding about equal quantities of bisulphate of soda or sulphuric acid.	III – IV.	III. The dyeings resist light or medium washing.	II. The dyeings resist only a light milling.
Naphtylamine Black 6B pat. 2 % 4 % 		III—IV. Somewhat better than 4B.	III.	
Naphtylamine Black X2B pat. 2 % 4 % 		III.	III.	
Naphtylamine Black X3B pat. 2 % 4 % 		III.	III.	
Naphtylamine Black 00 pat. 2 % 4 % 		III.	III.	
Naphtylamine Black D 2 % 4 % 		III	III – IV. The fastness to washing is very good.	II—III. The dyeings resist a light or medium milling.

Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	II - III. Becomes lighter and greener.	IV.	On ordinary steaming: IV. On severe steaming: III.		*Naphtylamine Black 4B is the most widely employed acid black and is most extensively used both for piece-goods and for weaving yarns, knitting yarns and fancy threads. The dyeings possess a fine shade resembling Logwood Black and are comparatively very fast to washing, rubbing, perspiration and hot pressing, resisting also carbonising and ordinary steaming. The fastness to light is very good and better than that of Logwood Black.*
IV.	III. Becomes lighter and greener.	IV.	On ordinary steaming: IV. On severe steaming: III - IV.		*Besides for woollen goods Naphtylamine Black 4B is also the most largely used product for cross-dyeing the wool in union goods. Naphtylamine Black 6B possesses the same properties as 4B, but dyes a still more blue-black shade and is faster to light and steaming. It is principally used for blue-blacks.*
IV.	II.	IV.	Same as with 4B.	Cotton is very slightly stained, and silk is dyed almost as deep a shade as wool, especially in a sulphuric acid bath.	
IV.	II.	IV.	Same as with 4B.		*Naphtylamine Black X2B, X3B and 00 are amongst the best covering Blacks and serve in the first place for producing jet black shades on piece-goods and yarns. Naphtylamine Black X3B dyes the most bluish shade and 00 the deepest shade.*
IV.	II.	IV.	Same as with 4B.		
IV.	I.	IV.	On light steaming: IV. On severe steaming: II.	Cotton is stained a pale reddish brown, silk being dyed as deep a shade as wool.	*Naphtylamine Black D is chiefly used in combination with 4B and 6B for the production of jet blacks.*

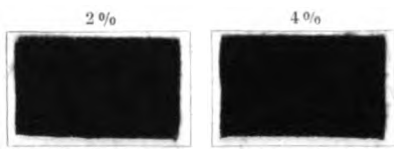
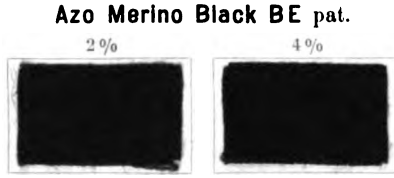
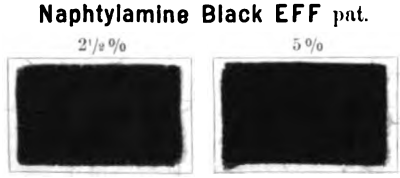
Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Naphtylamine Black S pat. 2 % 4 % 	Dye with the addition of 10% Glauber's salt and 8—10% bisulphate of soda, or 20% Glauber's salt and 3% sulphuric acid at 60—70° C. (140—160° F.), raise to the boil, in about 20 minutes, and boil for 1 hour. In order to perfectly exhaust the bath, add if necessary a further quantity of bisulphate of soda or sulphuric acid, and boil for another 20—30 minutes.	IV.	II—III. The dyeings behave similarly to those of Naphtol Black.	I—II.
Naphtylamine Black TJ pat. 2 % 4 % 		III—IV.		
Naphtylamine Black 7BS pat. 2½ % 5 % 		IV.		
Naphtylamine Black 4BS pat. 2½ % 5 % 		IV.		
Naphtylamine Black SS3B pat. 2 % 4 % 		III—IV.		
Naphtol Blue Black pat. 2 % 4 % 		IV. Exceedingly good.	II—III. Similar to Naphtylamine Black S.	I—II.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	IV.	IV.	IV.	Cotton is not stained, silk is only slightly tinted.	*The dyestuffs of the Naphtylamine Black S series generally behave like the Naphtylamine Black 4B; they offer however the advantage that they can be dyed direct with bisulphate of soda or sulphuric acid, and that they leave effect threads of cotton, ramie or artificial silk a much purer white. They are also somewhat superior to Naphtylamine Black 4B in point of fastness to steaming and light.*
IV.	IV.	IV.	IV.		*The dyestuffs find the most extensive application especially in piece-dyeing both for plain goods and for goods with effect threads, and also for dyeing hats and yarns.*
IV.	IV.	IV.	IV.		*Naphtylamine Black S is the brand of the series which on account of its full bluish black shade is most extensively used, both for light shades and for deep blacks, in particular also for fine dress cloth and worsted goods. For dyeing jet blacks it is shaded with Tropaeoline, Indian Yellow or Orange.*
					Naphtylamine Black TJ possesses the same properties, but a more covered shade, and is therefore used chiefly for full blacks.
					Naphtylamine Black 7BS yields very bright blacks with a bluish cast and serves for dyeing blue-black shades.
IV.	IV.	IV.	IV.		*Naphtylamine Black 4BS dyes a more violet shade than the "S" brand.*
					Naphtylamine Black SS3B yields a very deep black and is used principally for jet blacks.
					Other brands of the Naphtylamine Black S series are:
					***Naphtylamine Black T** (more violetish than the "S" brand),*
					„ „ TN (a bright, very covered black),
					„ „ SS2B (somewhat denser than SS3B),
IV.	IV.	IV.	IV.		*„ „ 6BS, „ „ 7B (yield blue-black shades similar to the "7BS" brand),*
					„ „ SGG (is more greenish than the "S" brand),
					„ „ SOO (yields very deep covered blacks).
IV.	IV.	IV.	IV.	Cotton and silk are tinted only slightly greenish-blue.	*Naphtol Blue Black is the most greenish Acid Black, possessing a great tinctorial power and brightness of tone when looked at overhand; its shade is not changed in artificial light.*
					The dyestuff is chiefly used for shading Naphtylamine and Naphtol Black in piece-, yarn- and hat-dyeing, and also to the largest extent for shading the wool in union goods.

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Naphtyl Blue Black N pat. 2 % 4 % 	With the addition of 1½% oxalic acid, 5% acetic acid and 20% Glauber's salt: enter at 60—70° C. (140—160 deg.F.), raise in about 20 minutes to the boil, boil for 1 hour, add 3% sulphate of copper and 3—4% acetic acid, allow to feed for another ½ hour without steam as per instructions on page 9. These colours may also be dyed without sulphate of copper, dyeings are however in such a case only moderately fast to steaming.	IV. Exceedingly good. Dyed without the addition of sulphate of copper: III—IV.	IV. The fastness to washing and water of the colours, especially when dyed with sulphate of copper, is very good.	III. The dyeings resist a fairly strong milling.
Naphtylamine Black R pat. 2% 4% 		IV. When dyed without sulphate of copper: III—IV.	IV. Not quite so good as Naphtyl Blue Black N.	III. Not quite so good as Naphtyl Blue Black N.
Naphtylamine Black RNB pat. 2% 4% 		III—IV. When dyed without sulphate of copper: III.	IV. Like Naphtylamine Black R.	III. Like Naphtylamine Black R.
Naphtylamine Black Cr pat. 2% dyestuff 4% ½% bichrome 1% 	Enter hot with the addition of 10% Glauber's salt and 10% bisulphate of soda, or 20% Glauber's salt and 4% sulphuric acid, after ¾ hour's boiling exhaust the bath by adding some bisulphate of soda or sulphuric acid, and then chrome at the boil for ½ hour with 1½—2% bichrome.	III—IV.	III - IV.	II—III.
Gloria Black B pat. 2% 4% 	With the addition of 10% Glauber's salt and 10% acetic acid; enter at about 60° C. (140 deg. F.), raise within ½ hour to the boil, and boil gently for 1 hour.	III—IV.	IV. The dyeings resist a severe washing exceedingly well.	III—IV. The dyeings withstand a fairly severe milling; white wool is not stained, white cotton only slightly tinted.
Neutral Wool Black B pat. 2% 4% 	With the addition of 10% Glauber's salt and 10% bisulphate of soda or neutral with 30% cryst. Glauber's salt; enter at 60° C. (140 deg. F.), raise within ½ hour to the boil, and boil gently for 1 hour.	III—IV.	IV. Similar to Naphtyl Blue Black N.	III. Similar to Naphtyl Blue Black N.

Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	II.	IV.	When dyed with sulphate of copper: IV; When dyed without sulphate of copper: on light steaming: III – IV; on severe steaming: II. Goods dyed with sulphate of copper and then carbonised behave on steaming like goods dyed without sulphate of copper.	Cotton is slightly stained, silk is dyed to the same extent as the wool.	*Naphtyl Blue Black N is one of the fastest black acid colours in point of fastness to light, and closely approaches the shade of logwood black, both in reflected and transmitted light. It is extensively used for producing blacks on navies in piece-dyeing, especially for fine grade cloths, worsteds, and for goods which are heavily sized with glue, and also for yarns required to be fast to washing, for slubbing, and shoddies.*
IV.	I.	IV.			*Its dyeings are thoroughly fast to rubbing, perspiration and hot pressing, retain their shade in artificial light, and withstand the potting process well if some acetic acid is added to the potting bath.* *The weight of the wool is increased by about 2% when dyeing with sulphate of copper, which is of special importance for knitting yarns and slubbing.* *Naphtyl Blue Black N is frequently dyed in combination with logwood or sumac.* *The two brands Naphtyl Blue Black FB and FBB are superior to the "N" in point of fastness to washing and milling, and are therefore used principally for milling articles.* *Naphtylamine Black R possesses similar properties, to Naphtyl Blue Black N, and dyes a deeper shade of black; it is frequently used in combination with the latter.*
IV.	I.	IV.			*Naphtylamine Black RNB behaves similarly to Naphtyl Blue Black N, and is chiefly used for yarns, especially knitting yarns, and for shoddies, on account of its good fastness to washing.* *A somewhat more bluish brand is Naphtylamine Black NBB.*
IV.	IV.	IV.	IV.	Cotton is left unstained, silk is however slightly tinted.	*Naphtylamine Black Cr is in the first place used for gentlemen's suitings containing white or coloured effect threads of cotton or ramie.* *It is superior to the ordinary acid blacks in point of fastness to alkalies, hot pressing and perspiration, and is therefore chiefly employed for goods which have to satisfy high requirements in this respect.*
IV.	IV.	IV.	IV. On severe steaming: III – IV.	Cotton is stained rather greenish, and silk is excellently covered.	*Gloria Black B is an important and valuable dyestuff for producing solid blacks on mixed fabrics consisting of wool and silk; it covers the latter excellently, and is used for dyeing so-called "gloria", woollen dress goods containing silk effect threads, and other similar goods.* *It is distinguished by a fine bluish shade of good fastness to light, and also by very good fastness to water.* *Two other brands, viz, Gloria Black I and II yield more covered blacks than the "B" brand.*
IV.	III. Turns yellower and browner.	IV.	On normal steaming: IV; on severe steaming: II – III.	Cotton is dyed a pale grey shade, silk is excellently covered.	*Neutral Wool Black B possesses properties similar to those of Gloria Black and is applied in a like manner. As the product exhausts well in a neutral bath, it is also extensively used for dyeing the wool in union materials, and for dyeing mixed fabrics consisting of wool, cotton and silk.* *Another, more greenish brand is Neutral Wool Black G.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Azo Merino Black 8B pat. 2 % 4 % 	With the addition of 10% Glauber's salt and 15% bisulphate of soda, or, 20% Glauber's salt and 5—6 % sulphuric acid.	III—IV.	II. The dyeings resist only a light neutral washing.	I.
Azo Merino Black 6B pat. 2 % 4 % 		III—IV.		
Azo Merino Black 6BE pat. 2 % 4 % 		III—IV. Not quite so good as the "6B" brand.		
Azo Merino Black B pat. 2 % 4 % 		III.		
Azo Merino Black BE pat. 2 % 4 % 		III—IV.		
Naphtylamine Black EFF pat. 2½ % 5 % 	Like Naphtylamine Black S.	IV.	II. The dyeings withstand only a light neutral washing.	I.

Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	IV.	IV. When only washed in water the shade appears redder, neutralising with soda however reproduces the original shade.	IV.		
IV.	IV.	IV. Like the "8 B" brand.	IV.		*The Azo Merino Blacks are distinguished for their excellent levelling and penetrating property, and possess full, bloomy shades, resembling logwood black very closely, and not changing in artificial light.* *The products are most extensively used for dyeing ladies dress materials of all kinds, such as cheviots, cashmeres, plain cloths, goods with cotton effect threads, and in general, materials which have to be dyed in strongly acid baths and for which the time of dyeing has to be as short as possible.*
IV.	IV.	IV. Like the "8 B" brand.	IV.	Leaves the cotton very clean, staining silk slightly.	*Azo Merino Black 8 B is the most bluish brand and is chiefly used for light blue blacks with a greenish-blue tone.* *Azo Merino Black 6 B yields very bloomy bluish black shades, approaching the shade of logwood black closest in transmitted and reflected light, and is extensively used for dyeing blue blacks.*
IV.	IV.	IV. Like the "8 B" brand.	IV.		*Azo Merino Black 6 B E covers better than the "6 B" brand, and is more violet in shade. It is used for the same purposes.* *Azo Merino Black B possesses a great tinctorial power and finds in the first place extensive application for dense blacks.* *Azo Merino Black B E dyes the most covered shade and is principally used for dyeing jet blacks.*
IV.	IV.	IV. Like the "8 B" brand.	IV.		
IV.	IV.	IV.	IV.	Cotton is left completely unstained, silk is tinted a pale grey.	*Naphtylamine Black E F F behaves generally like Naphtylamine Black S; it offers however the advantage of leaving cotton or other effect threads a still purer white than the latter.* *It is therefore used most extensively for gentlemen's and ladies' dress goods containing effect threads.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing
Hat Black FC pat.	With the addition of 10—20 % Glauber's salt and 2—3 % sulphuric acid at 60—70° C. (140—160 deg.F.); raise in about 20—30 minutes to the boil, and boil until the hats are completely dyed through. Then exhaust the bath by continued boiling and gradually adding another 2—3 % sulphuric acid. Acid-milled wool felts and fur felts are best dyed with Glauber's salt alone, adding the sulphuric acid only at the finish, in order to completely exhaust the bath.	IV.	IV. The fastness to water of the dyeings is very good, especially with wool felts. Fur felts which have been dyed with a very high percentage of dyestuff may be after-chromed in order to ensure best resistance to water. To this end about 3 % bichromate of potash are added in 2—3 portions to the exhausted dyebath, the hats being worked for another ½ hour at boiling temperature.
Hat Black MC pat.		IV.	
Hat Black F pat.		IV.	
Hat Black BB pat.		IV.	
Hat Black 3BV pat.		IV.	
Hat Black 5BV pat.		IV.	

Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	III–IV.	IV.	IV.	Cotton is stained slightly greenish, silk is dyed the same depth as the wool.	
IV.	IV.	IV.	IV.	Cotton is stained very slightly yellowish, silk however is only very slightly stained.	*The Hat Blacks are special products for the dyeing of hats and find the most extensive application for wool and fur felts.*
IV.	III.	IV.	IV.	Cotton is stained a pale reddish-blue, silk is stained rather heavily.	*In addition to a beautiful shade, they possess the most excellent penetrating properties and are distinguished for very good fastness to water, light, rubbing, steaming, and hot pressing.*
IV.	II—III.	IV.	IV. On very severe steaming: III.	Cotton is stained slightly reddish-brown, silk is dyed almost the same shade as the wool.	*They are dyed in a sulphuric acid bath.*
IV.	III.	IV.	IV. On very severe steaming: III–IV.	Like the "BB" brand.	*Hat Black FC is largely used for wool and fur felts; in addition to a fine blue black shade the product offers the advantage that it exhausts already with very little acid, and that it possesses very good fastness to steaming. It has therefore been especially adopted for dyeing fur felts.*
IV.	III.	IV.	IV.	Cotton is stained slightly reddish-grey, silk is only faintly tinted.	*Hat Black MC is the principal product for wool felts. It penetrates excellently and is extremely fast to steaming, yielding a full black with a blue cast.*
					Hat Black F is the most bluish brand and is chiefly used for blue-blacks.
					Hat Black BB yields more covered blacks than the "FC" brand and is used both for wool and fur felt hats.
					A more bluish brand is Hat Black BBV.
					Hat Black 3BV and 5BV retain their blue-black tone even in very deep shades and are therefore used in combination with the other Hat Blacks for shading the same towards blue.

B. Chrome Colours.

(Anthracene Chrome Colours and Anthracene Acid Colours.)

Chrome Colours. (Anthracene Colours.)

General Remarks.

Our Anthracene Chrome and Anthracene Acid Colours which are dyed according to the one-bath process have been extensively adopted for the production of particularly excellent fast shades, especially in point of fastness to milling, their simple and rapid method of dyeing warranting the best possible preservation of the woollen material.

They are in the first place employed for dyeing shades fast to milling on loose wool, shoddy, slubbing, and yarn, in the open kettle, as well as in the dye vat, or in dyeing machines. The dyeings possess all the qualities usually required for this class of goods; they are thoroughly fast to washing, milling and water, very fast to light, and fast to acids, perspiration, alkalies, stoving, carbonising, hot pressing, and steaming.

On piece-goods the dyestuffs are also used for dyeing shades fast to light, washing, steaming and hot pressing, and in Vigoureux printing for producing "melanges" or mixed effects fast to light and milling.

The simplest, and also best, method of dyeing is the one-bath process, bichromate of potash or bichromate of soda generally serving as fixing agents. Chromium fluoride may also be employed for this purpose, but the dyeings will then not turn out quite so fast to milling.

Most of the Anthracene Colours can also be dyed very well on a chrome mordant; this method is however only resorted to in special cases, for instance with the various Anthracene Chrome Blues for dyeing very fast bright blues, or when dyeing in combination with Alizarine Colours which cannot be dyed according to the one-bath process.

Very bright shades fast to milling, which cannot be produced with Anthracene Colours alone, are dyed with the addition to the same bath of some acid colours, such as Brilliant Milling Green B,

Formyl Blue B, Formyl Violet (all brands), Wool Red B or Milling Yellow. These dyestuffs also withstand an after-chroming very well, and are noted both for their bright shade and fastness to milling.

Dissolving the Colours.

The Anthracene Colours are dissolved by pouring clean boiling water over them (see page 2).

Methods of Dyeing the Chrome Colours.

(Anthracene Chrome and Anthracene Acid Colours.)

Method I.

For Anthracene Chrome Blue, Anthracene Chrome Brown, Anthracene Chrome Red, Anthracene Chrome Violet, Anthracene Acid Brown G, Anthracene Yellow BN, Anthracene Acid Black SR, SAS, SBB, SA.

Charge the dyebath with

10 % Glauber's salt,
1—4 % sulphuric acid
and the dyestuff,

enter at 60—70° C. (140—160 deg. F.), raise to the boil within about 20 minutes, and continue boiling for 1—1¼ hour; cool off again to 60—70° C. (140—160 deg. F.), add the requisite quantity of bichromate of potash (about two-thirds of the weight of the dyestuff used), and boil for another ¾ hour.

Anthracene Chrome Brown D must not be dyed with more than 3 % sulphuric acid, whilst for Black up to 5 % are required.

When dyeing Anthracene Chrome Violet, Anthracene Chrome Blue, or any of the above mentioned Anthracene Acid Blacks in copper vessels or machines, the dyebath is first heated to about 60° C. (140 deg. F.) and charged with ¼—½ % sulphocyanide of ammonia (of the weight of the wool); the liquor is then stirred well, or circulated in the machine, and, after allowing to stand for 10—20 minutes, the dyestuff, acid and Glauber's salt are added.

Method II.

For Anthracene Yellow C, R, GG, Anthracene Acid Brown R, N, B, V, SW.

With the exception of the Anthracene Acid Blacks, all the products mentioned under the previous heading (Method I) can be dyed according to Method II.

Charge the bath with

10 % Glauber's salt,
1—2 % acetic acid of 8° Tw.
and the requisite dyestuff.

Enter at 40 – 50° C. (105 – 120 deg. F.), raise gradually to the boil, and exhaust the bath after half an hour's boiling by a gradual addition of

3—6 % acetic acid, or

2—4 % bisulphate of soda or 1—2 % sulphuric acid.

After exhausting the bath, cool off to 60-70° C. (140-160 deg. F.), add about half the quantity of bichromate of potash as of dyestuff, and boil for another half to three quarters of an hour.

Anthracene Yellow GG is more advantageously after-treated with chromium fluoride instead of bichromate of potash, using equal weights of same as of dyestuff but not exceeding 3½ % of chromium fluoride.

Method III.

For all brands of Anthracene Chrome Black and for Anthracene Acid Black NS, SW, LW, ST.

Calcareous water should first be corrected by the addition of

5—10 oz of oxalate of ammonia*) per 100 gallons;

stir well and then add

2—3 % acetic acid

*) Oxalate of ammonia crystals, technically pure, can be bought in the regular market, or may be prepared as follows:

For a dyebath of 100 gallons dissolve

5 — 10 oz oxalic acid in
1 — 2 gallons hot water

and neutralise the solution by adding about 6½ – 14 oz ammonia 0,913 spec. gravity.

and the requisite dyestuff, entering the goods at 70—80° C. (160—175 deg. F.) or at the boil. After half an hour's boiling, exhaust the bath by the gradual addition of

2— 4% sulphuric acid

or

6—10% bisulphate of soda

(about 1% more bisulphate than dyestuff),

and, as soon as the liquor shews only a slight reddish colour, chrome the goods for 1/2 to 3/4 hour with

1 1/2—3% bichromate of potash.

For 5% dyestuff 1 1/2% bichromate of potash is used
„ 6% „ 2 % „ „ „ „ „
„ 7% „ 2 1/2% „ „ „ „ „
„ 8% „ 3 % „ „ „ „ „

Anthracene Chrome Black 5B and P extra, and also Anthracene Acid Black ST do not require an addition of oxalate of ammonia.

The chroming may also be done in a fresh liquor, which course is specially recommended for dyeing Anthracene Chrome Black in the standing bath.

In this case, the old dyebath is charged with about 1 1/2 oz oxalate of ammonia per 100 gallons liquor, adding the requisite dyestuff, and exhausting the bath with bisulphate of soda or sulphuric acid, same as with the first lot.

When working according to this method, the first chroming bath, is charged with

1 1/2—3% bichromate of potash (as above) and
2% hydrochloric acid,

whereas for subsequent lots 3/4 of the quantities used for the first chrome bath will be sufficient.

The stated quantities of bisulphate of soda and sulphuric acid have reference to dyeing in a normal volume of water, and have to be increased correspondingly when dyeing in very diluted baths. An excess of bisulphate of soda, or acid, or of bichromate of potash, and also too severe boiling during the chroming operation, should be avoided; otherwise a less bloomy shade will be obtained.

Method IV.

For dyeings on chrome mordants.

All the Anthracene Chrome and Anthracene Acid Colours, with the exception of the Blacks, may be dyed on chrome mordants.

This method is especially valuable for the production of bright blues; the afterchroming process, however, yields colours which are faster to milling and fuller in shade.

The dyeing on chrome mordants is carried out in the usual manner by dyeing the wool, previously mordanted with bichromate of potash and tartar, in a bath slightly acidulated with acetic acid. Oxalic acid, lactic acid, lactoline or similar products may also be employed instead of tartar.

Mordant for instance for 1½ hour with

2 —4% bichromate of potash and

1½ —3% tartar

rinse and dye in a fresh bath with the addition of

1—3% acetic acid of 8° Tw.;

enter at 40—50° C. (105—120 deg. F.), raise within half an hour to the boil, and continue boiling for one to two hours; if necessary some acetic acid is added for exhausting the baths.

In order to obtain the best possible fastness to milling, dark shades are advantageously afterchromed in the exhausted dyebath at the boil, with ½ to ¾% bichromate of potash.

Subsequent Dyeing in the Standing Bath.

The exhausted baths of the afterchromed dyeings may be used over again for several lots, but in such case it is advisable to first boil the goods for 20—30 minutes in the old bath so that the goods may absorb the chrome still contained therein.

Subsequent Shadingof the Dyeings.

For shading the already afterchromed dyeings the same Anthracene Colours as employed for dyeing are usually applied, especially in the case of loose material; this is carried out by cooling the bath off a little, adding the well dissolved and diluted dyestuff, gradually heating again to the boil, and boiling

for $^1/_4$—$^1/_2$ hour. If considerable quantities of Anthracene Colours (more than one-fourth of those used originally) are applied in the subsequent shading, they must be fixed by means of a little bichromate of potash in order to attain the best possible fastness to milling; this subsequent chroming may however be omitted if only small quantities of Anthracene Colours are added.

On the other hand the chromed dyeings may also be shaded with acid colours possessing good fastness to milling, the following being very well adapted for the purpose:

Brilliant Milling Green B
Formyl Blue B
Formyl Violet, all brands
Milling Yellow O
Wool Red B.

It is advisable for shading to first cool the bath off a little and then to add the well dissolved dyestuff.

For piece-goods and yarns the following easily levelling dyestuffs may be used for subsequent shading:

Cyanole extra
Tetra Cyanole V
Cyanole Green B and 6G
Cyanole Fast Green G
Azo Orseille BB
Lanafuchsine SG and SB
Orange extra and GG
Acid Yellow AT.

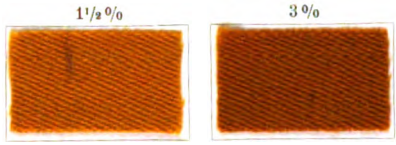
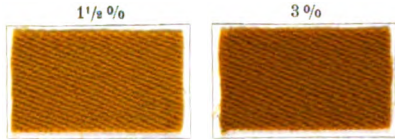
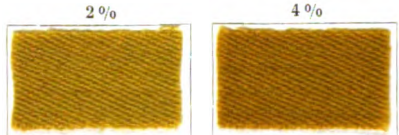
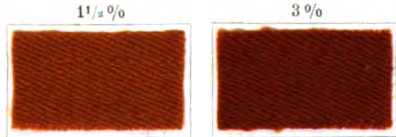
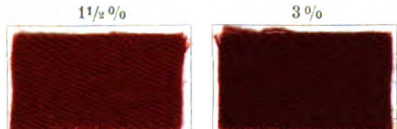
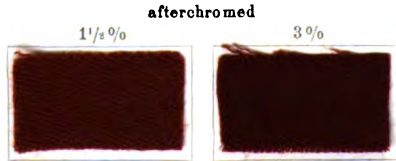
These dyestuffs may be added straight to the hot chrome bath.

Dyeings of the Chrome Colours (Anthracene Colours)

with a Synopsis of their Properties and Fastness.

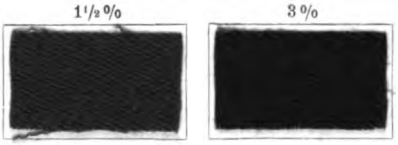
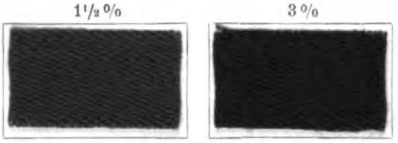
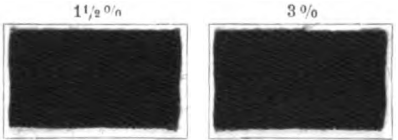
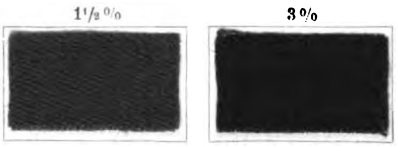
In the classification of the fastness, "I" denotes the lowest, and "IV" the highest degree of fastness.

The remarks regarding the staining of cotton likewise apply to linen, China-grass (ramie) and artificial silk. The dyeing of goods with effect threads is dealt with in a special chapter.

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Anthracene Yellow C powder afterchromed 1½ % 3 % 	Commence dyeing with 1—2% acetic acid, exhaust the bath with acetic acid, and then chrome with bichromate of potash.	IV. Exceedingly good.	IV. The dyeings are exceedingly fast to washing and water.	IV. The dyeings withstand the severest cloth milling without staining cotton or wool.
Anthracene Yellow BN afterchromed 1½ % 3 % 	Dye with the addition of acetic acid, same as the "C" brand, or with sulphuric acid according to method I stated on page 60, then chrome with bichromate of potash in the same bath.	IV.		IV.
Anthracene Yellow GG afterchromed with chromium fluoride 2 % 4 % 	Commence dyeing with acetic or sulphuric acid, and afterchrome with the same quantity of chromium fluoride as dyestuff used.	IV. Exceedingly good.		IV.
Anthracene Acid Brown G pat. afterchromed 1½ % 3 % 	Dye with the addition of acetic or sulphuric acid, and afterchrome same as with Anthracene Yellow BN.	III—IV.		III—IV. The fastness to milling answers normal requirements.
Anthracene Acid Brown R pat. afterchromed 1½ % 3 % 	Same as with Anthracene Yellow C.	IV.		III—IV. The dyeings do not bleed even on severe milling, but become bluer: the original shade however almost completely returns on souring off.
Anthracene Acid Brown N pat. afterchromed 1½ % 3 % 		III—IV.		IV. The dyeings withstand the severest cloth milling process and neither stain cotton nor wool.

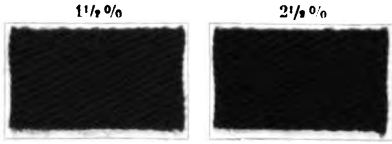
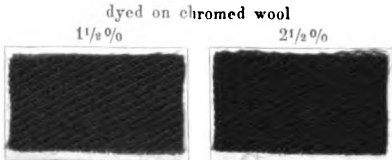
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	III. Becomes a little paler.	IV.	IV.	Cotton is stained a little, silk rather considerably so.	*Anthracene Yellow C is the fastest chroming yellow in point of fastness to light and milling, and is distinguished by its great tinctorial power. In shade it corresponds fairly with fustic dyed on a chrome mordant and has supplanted the latter to the largest extent on account of its far superior fastness to light and acids. It is extensively used for producing fast yellow and compound shades on loose wool, slubbing, yarn and shoddy, and also for Vigoureux printing. When dyed direct it also possesses a remarkably good fastness to washing. Anthracene Yellow C is sold in powder and paste form. Another brand is Anthracene Yellow R, which is distinguished from the "C" brand only by its somewhat redder shade.*
IV.	II - III.	IV.	IV.	Cotton is not stained at all and silk but very slightly.	*On account of its easy solubility and excellent levelling properties, Anthracene Yellow B N is given preference in machine-dyeing, and also for producing mode and other compound shades on loose wool, slubbing, yarn and pieces; it is further employed extensively for Vigoureux printing.*
IV.	III—IV.	IV.	IV.	Cotton is stained a little, silk dyed almost the same depth as the wool.	*When fixed with chromium fluoride, Anthracene Yellow G G yields a yellow with a pronounced greenish cast, and serves for producing greenish yellows, and as a shading product for green.*
IV.	II—III.	IV.	IV.	Cotton and silk are tinted lightly brownish.	*Anthracene Acid Brown G may be dyed with acetic acid or with sulphuric acid, and is one of the most important shading products for the Anthracene Acid and Anthracene Chrome Colours.*
III. Turns somewhat bluer.	IV.	IV.	IV.	Cotton is tinted lightly brownish, but silk is heavily stained.	*Anthracene Acid Brown R is noted for its prominent fastness to light and is used principally for reddish browns on yarns and pieces.*
IV.	IV.	IV.	IV.	Like the "R" brand.	*Used for producing brown and dark mode shades.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Anthracene Acid Brown B pat. afterchromed 1½% 3% 	Same as with Anthracene Yellow C.	III.	IV. The dyeings are exceedingly fast to washing and water.	IV. Same as with Anthracene Acid Brown N.
Anthracene Acid Brown V pat. afterchromed 1½% 3% 		III.		IV. Same as with Anthracene Acid Brown N.
Anthracene Chrome Brown D afterchromed 1½% 3% 	Commence dyeing with 10% Glauber's salt and 1—4% sulphuric acid, and chrome for ¾ hour in the exhausted bath with bichromate of potash as stated on page 60 for method I. With Anthracene Chrome Brown D or A not more than 3% sulphuric acid should be used.	IV.		IV. Exceedingly good. Does not bleed even in the severest milling either on wool or cotton.
Anthracene Chrome Brown A afterchromed 1½% 3% 		IV.		IV. Like the "D" brand.
Anthracene Chrome Red A afterchromed 1½% 3% 		IV.		IV. Same as with Anthracene Chrome Brown D.
Anthracene Chrome Violet B afterchromed 1½% 3% 		IV. Exceedingly good.		IV. Very good. On very severe milling only cotton is slightly stained.

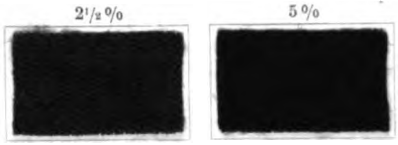
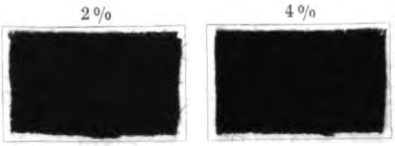
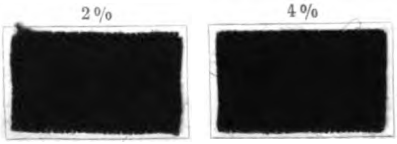
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	IV.	IV.	IV.	Cotton is stained slightly brownish, silk however more perceptibly.	*Anthracene Acid Brown B and V are extensively employed for producing medium and dark brown shades, especially on loose wool.*
IV.	IV.	IV,	IV.	Like the "B" brand.	*A more yellowish brand is **Anthracene Acid Brown SW.***
IV.	IV.	IV. Becomes a little paler.	IV.	Cotton is stained slightly brownish, silk however is only very lightly stained.	*Anthracene Chrome Brown D is dyed in a sulphuric acid bath with the addition of about as much acid as dyestuff used, but not more than 3% sulphuric acid.* *It is easily soluble, levels very well and is therefore employed extensively for the dyeing of mode shades, browns, olives, etc. on loose wool, slubbing, yarns, piece-goods, and hats, and especially also in machine-dyeing and for Vigoureux printing.*
IV.	IV.	IV. Becomes a little paler.	IV.	Similar to Anthracene Acid Brown B.	*Anthracene Chrome Brown A possesses similar properties to the "D" brand and serves principally for producing full shades of brown.*
IV.	IV.	IV.	IV.	Cotton remains white, silk is slightly stained.	*Anthracene Chrome Red A possesses the same excellent properties as Anthracene Chrome Brown D, and is extensively employed for producing dark reds, clarets and reddish browns, and as a reddening agent for all mode shades.*
IV.	IV.	IV.	IV.	Cotton remains white, silk is only very slightly stained.	*Anthracene Chrome Violet B surpasses Anthracene Chrome Red A in point of fastness to light, and is also very easily soluble; it levels well and is used as a shading product for clarets, prunes and navy blues.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Anthracene Chrome Blue R pat. dyed on chromed wool 1½ % 2½ % 	Commence dyeing with the addition of 10% Glauber's salt and 1—4% sulphuric acid, then chrome in the exhausted bath with bichromate of potash, according to method I detailed on page 60. Or: Dye on a chrome mordant with the addition of 3—6% acetic acid. Note: When dyeing in bright clean copper vessels, the hot dyebath should first be charged with ½% ammonium sulphocyanide (calculated on the weight of the goods to be dyed) and be left standing for ¼ hour before the dyestuff, Glauber's salt and acid are added.	IV. The fastness to light is extremely good.	IV. The dyeings are exceedingly fast to washing and water.	Afterchromed dyeings: IV. Exceedingly good. Dyed on chromed wool: III—IV.
Anthracene Chrome Blue B pat. dyed on chromed wool 1½ % 2½ % 				
Anthracene Chrome Blue BB pat. dyed on chromed wool 1½ % 2½ % 				
Anthracene Chrome Blue G pat. dyed on chromed wool 1½ % 2½ % 				
Anthracene Chrome Blue F pat. dyed on chromed wool 1½ % 2½ % 				
Anthracene Acid Blue D dyed on chromed wool 1½ % 2½ % 	Same as with Anthracene Chrome Blue.	II—III.	IV.	When afterchromed or dyed on chromed wool: IV.

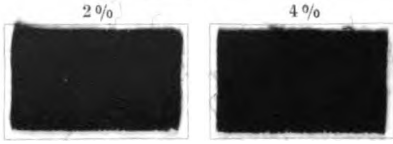
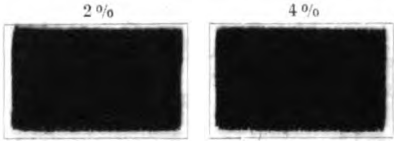
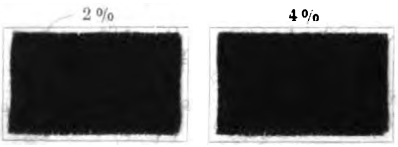
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	IV.	IV.	IV.	Cotton and silk are not stained.	
IV.	IV.	IV.	IV.	Cotton is not stained, silk is tinted only a light blue.	*The Anthracene Chrome Blues are used extensively for producing fast blues, and as shading products fast to light and milling for all compound shades. On account of their easy solubility they are very well suited for machine-dyeing and Vigoureux printing.*
IV.	IV.	IV.	IV. On severe steaming the shade becomes a little more greenish.	Cotton is stained slightly reddish violet, silk slightly brownish.	*These dyestuffs may either be dyed according to the one-bath method or on chromed wool.*
IV.	IV.	IV.			*Dyeing with sulphuric acid and subsequent chroming (one-bath method) yields the fastest colours in point of fastness to milling, and is therefore employed especially for loose wool and for producing compound shades in combination with other Anthracene Colours.*
					On previously chromed material (two-bath method) brighter shades are obtained; this process comes principally into consideration for bright shades on gentlemen's suitings, yarns and slubbing, and for combinations of Anthracene Chrome Blue with Alizarine Colours.
IV.	IV.	IV.			*Anthracene Chrome Blue R and B leave cotton effect threads perfectly white, and for this reason these brands are extensively employed for producing dyeings of special fastness to alkalies, hot pressing and perspiration on gentlemen's suitings containing effect threads.*
					The "F" brand is distinguished from all the other Anthracene Chrome Blues by its brightness of shade, surpassing them also in fastness to potting.
IV.	IV.	IV.	IV.	Cotton is not stained and silk tinted only slightly bluish.	
IV.	IV.	IV.	IV. On severe steaming the shade becomes greener. III.	Cotton is not stained, but silk is stained noticeably.	*Anthracene Acid Blue D dyes on chromed wool bright blues and navies fast to milling.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Anthracene Acid Black ST pat. afterchromed 2 % 4 % 	Commence dyeing with the addition of 10% Glauber's salt and 5% acetic acid, exhaust the bath with bisulphate of soda or sulphuric acid and then chrome with bichromate of potash.	IV.	IV. The dyeings are very fast to washing and water.	IV. The fastness to milling is very good; on severe milling only cotton is stained slightly bluish.
Anthracene Acid Black SR pat. afterchromed 2 % 4 % 	Commence dyeing with 10% Glauber's salt and 4—5 % sulphuric acid, and chrome in the exhausted bath with bichromate of potash according to method I described on page 60.	IV. Light blacks: III—IV.		
Anthracene Acid Black SAS pat. afterchromed 2½ % 5 % 	The SR brand requires about ½ and the SAS and SBB about ⅓ as much bichromate of potash as dyestuff used. Note: When dyeing in copper vessels, the hot dyebath is first charged with ½% ammonium sulphocyanide (calculated on the weight of the goods) and then left standing for ¼ hour before the dyestuff, Glauber's salt and acid are added	III—IV. Same as with the SR brand.	IV. The fastness to washing and water is almost the same as that of Anthracene Acid Black ST.	III—IV. The fastness to milling alongside of wool is very good, whereas cotton on severe milling is only very slightly stained.
Anthracene Acid Black SBB pat. afterchromed 2½ % 5 % 				
Anthracite Black B pat. afterchromed 2 % 4 % 	Commence dyeing with the addition of 10 % Glauber's salt, and 5 % acetic acid at 60° C. (140° F.), raise the temperature in ½ hour to the boil, and after ¾ hour's boiling gradually exhaust the bath by the addition of 3—5 % bisulphate of soda in several portions.	IV.	IV.	IV. Similar to Anthracene Acid Black ST.
Anthracite Black R pat. afterchromed 2 % 4 % 		III - IV.		

Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	III - IV.	IV.	IV.	Cotton and silk are not stained at all.	*Anthracene Acid Black ST is chiefly used for piece-dyeing, and yields very fine blacks which are very fast in every respect. Especially remarkable is the good fastness to rubbing and perspiration of the dyeings. Vegetable and silk effect threads are not stained at all, and the dyestuff is therefore used most extensively also for dyeing gentlemen's suitings containing cotton or silk effect threads, and further for union linings (Italians, serges, etc.) containing a fast black warp and white lists or effects. Regarding the dyeing of gentlemen's suitings with silk effect threads we refer to the chapter dealing specially with this subject.*
IV.	IV.	IV.	IV.	Cotton is stained very slightly reddish grey, silk a greenish blue.	*All three brands are distinguished for their excellent levelling property and very good solubility. They are dyed with sulphuric acid and extensively employed for producing blacks fast to milling on all kinds of materials, especially on slubbing, shoddy and yarn. They are likewise favoured on account of their good penetrating property, chiefly so the SR and SBB brands.*
IV.	III – IV.	IV.	IV.	Cotton is stained pale grey, silk however assuming a greenish tint.	*Anthracene Acid Black SR is the most covered black and produces very fine, deep blacks with a bluish cast.*
					Anthracene Acid Black SAS is more greenish than the SR and has been largely adopted especially for dyeing shoddy.
					Anthracene Acid Black SBB is chiefly employed for blue-blacks, and for navies and dark blues in combination with Formyl Violet or Formyl Blue.
IV.	IV.	IV.	IV.	Cotton is stained very slightly reddish, and silk a bluish grey.	*Another brand is Anthracene Acid Black SA, which dyes more reddish shades than the SR and is used principally for producing jet blacks at a low cost.*
IV.	IV.	IV.	IV. On severe steaming: II III.	Cotton is stained bluish grey, whereas silk is dyed the same depth of shade as the wool.	*Anthracite Black is the fastest direct acid black in point of resistance to washing and milling.*
					On account of its pronounced bluish tone it serves, in combination with Formyl Violet or Formyl Blue, mainly for producing navies and dark blues fast to washing and milling on yarn, slubbing and loose wool.
					It is also extensively applied in the silk dyeing industry (yarn, silk noils and burls) for the production of blacks and navies fast to washing and milling.
					In addition to the B and R, the special brand Anthracite Black EG for Vigoureux printing is known to the trade.

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Anthracene Chrome Black F pat. afterchromed 2 % 4 % 	Commence dyeing with 3—4% acetic acid, or, in case of very calcareous water, with the addition of 2% oxalate of ammonia and 3—4% acetic acid, exhaust the bath with bisulphate of soda or sulphuric acid, and then chrome with bichromate of potash according to method III described on page 61. For Anthracene Chrome Black 5 B and P extra, the addition of oxalate of ammonia can be dispensed with even if the water be calcareous.	IV.	IV. The dyeings are fast to washing and water.	IV. The fastness to milling is very good. Neither wool nor cotton are stained, not even on severe milling.
Anthracene Chrome Black FE pat. afterchromed 2 % 4 % 		IV.		
Anthracene Chrome Black FR pat. afterchromed 2 % 4 % 		III—IV.		
Anthracene Chrome Black 5B pat. afterchromed 2½ % 5 % 		IV.		
Anthracene Chrome Black P extra pat. afterchromed 2 % 4 % 		IV.		IV. The dyeings are remarkably fast to milling and answer the most exacting requirements.
Anthracene Acid Black NS pat. afterchromed 2 % 4 % 		IV.		IV. The fastness to milling is very good; only on very severe milling cotton is stained slightly bluish.

Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	IV.	IV.	IV.	Cotton is stained just very slightly reddish grey, but silk more perceptibly so.	*On account of its deep blue-black shade and its excellent properties of fastness, Anthracene Chrome Black F is most extensively used for producing fast blacks in all branches of wool dyeing and in Vigoureux printing. In Germany, Austria and Hungary and other countries its use for dyeing military cloths has been approved by special orders of the respective War Departments.*
IV.	IV.	IV.	IV.	Cotton is stained slightly reddish grey, whereas silk is tinted brownish.	*It is easily soluble and therefore well suited for machine-dyeing, and at the same time it levels so well that even skin wools are dyed very evenly and without the so-called "tippings". Owing to its excellent levelling properties it is also very extensively used in piece-dyeing.* *Its beautiful shade is similar to logwood and remains unchanged in artificial light.* *When aftertreated with equal parts of bichromate of potash and sulphate of copper, the black is turned a little more to the bluish violet side, and its excellent fastness to light is still further improved.* *Anthracene Chrome Black FE possesses the same good properties of fastness as the F brand and is chiefly used for jet blacks on account of its more covered shade.*
IV.	IV.	IV.	IV.	Like the FE brand.	*This dyestuff almost equals the aforestated brands in point of fastness, and is used for dyeing very deep blacks on loose wool and slubbing.*
IV.	IV.	IV.	IV.	Cotton is stained just very slightly reddish grey, silk however is coloured dark grey.	*Anthracene Chrome Black 5B even surpasses the F brand in point of fastness to light and potting. On account of its greenish blue shade it is especially suited for the production of blue-blacks and for shading other chrome colours, especially the F and P extra, in combination with which it yields very deep blue-blacks with a bright blue cast. It is also very largely used for producing grey "melanges" on slubbing, for dyeing blacks on stiff fur felt hats, and for the production of dark blues and dark greens in combination with Anthracene Chrome Blue, Anthracene Yellow etc.*
IV.	IV.	IV.	IV.	Cotton is stained just very slightly reddish grey, whereas silk is tinted brownish.	*Anthracene Chrome Black P extra is distinguished for its particularly good fastness to potting. It is most extensively used for dyeing loose wool, slubbing and worsted yarns, and answers the most exacting requirements.*
IV.	III—IV. Becomes slightly redder.	IV.	IV.	Like Anthracene Chrome Black F.	*This dyestuff belongs to the cheaper chrome blacks and is used on loose wool, shoddy, slubbing, and yarn.* *Two further brands, the Anthracene Acid Blacks SW and LW differ from the NS mainly by their more purple shades; the LW in particular dyes a pronounced purple black.*

C. Diamine Colours.

Diamine Colours.

General Remarks.

The Diamine Colours have gained great favour in the various branches of wool dyeing, especially for the dyeing of knitting yarns fast to washing, carded wool and worsted yarns fast to milling, shoddies, loose wool, and also for dyeing slubbing and yarn in machines.

This result is owing to their simple method of dyeing, their excellent fastness to washing and very good fastness to milling.

Some Diamine Colours are also fixed so perfectly by after-treatment with metallic salts, that they can be used even for materials which have to stand severe milling; e. g. Diamine Fast Red F aftertreated with chromium fluoride or bichromate of potash, Diamine Green G with chromium fluoride, Diamine Brown M and B with sulphate of copper and bichromate of potash.

Most of the Diamine Colours are fast to stoving.

In a neutral bath the Diamine Colours cover any admixtures to the wool, such as cotton etc., thus rendering the carbonising as a rule unnecessary; nevertheless all the dyeings withstand the carbonising process very well.

Dissolving the Dyestuffs.

The Diamine Colours are dissolved by pouring pure boiling water over them (see page 2).

Method of Dyeing.

Pale shades are best dyed with the addition of

10 % Glauber's salt crystals

or

10 % Glauber's salt crystals and
5 % acetate of ammonia*)

*) Acetate of ammonia is prepared by mixing
10 oz ammonia of 0,913 spec. gravity (24%) and
26¼ „ acetic acid of 8° Tw. (30%).

The solution must be neutral and should not materially alter blue or red litmus paper.

For very pale shades the addition of Glauber's salt may be altogether omitted.

The scoured material is entered at about 60° C. (140 deg. F.), the temperature of the bath raised to the boil, and boiling continued for 1/2—1 hour. The shade is then sampled, and the shading if necessary carried out direct in the boiling bath.

Medium and dark shades are dyed as described above with the addition of

20 % Glauber's salt crystals

or

20 % Glauber's salt crystals and
5 % acetate of ammonia.

In order to completely exhaust the baths, 2—5 % acetic acid may be added after about 3/4 hour's boiling. For dyeings which are not aftertreated, it is in most cases more advantageous to dispense with the addition of acid altogether in order to ensure perfect levelness.

After-treatment.

The aftertreatment with bichromate of potash or chromium fluoride is carried out by adding to the exhausted dyebath

1/2—2 % bichromate of potash (about half the weight of the dyestuff employed)

or

1—3 1/2 % chromium fluoride (about the same weight as of dyestuff, but not more than 3 1/2 %),

and boiling for another 1/2 hour.

The aftertreatment with sulphate of copper is carried out in the same manner, about equal weights of sulphate of copper as of dyestuff being used.

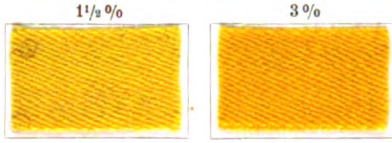
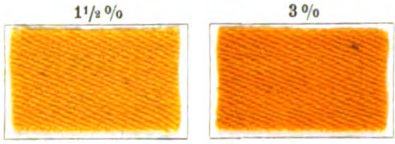
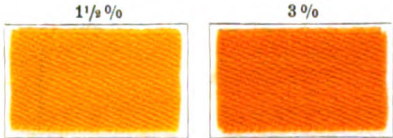
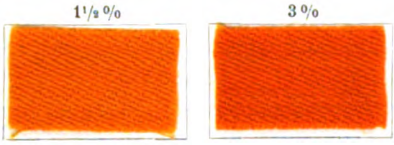
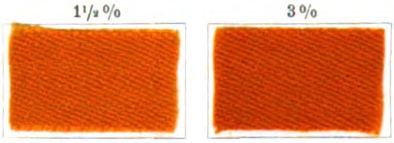
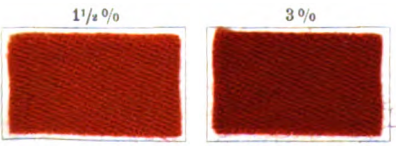
The aftertreatment with bichromate of potash and sulphate of copper simultaneously is effected in a like manner, with 1/2—2 % bichromate of potash and 1/2—2 % sulphate of copper.

Should the dyebath not be completely exhausted, the aftertreatment is best done in a separate bath with the addition of 3—4 % acetic acid.

Dyeings of the Diamine Colours

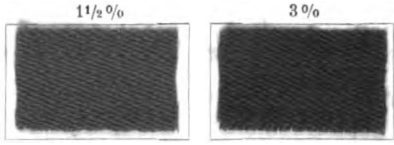
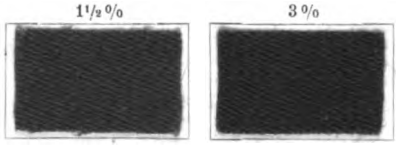
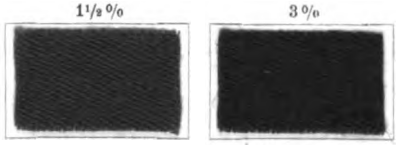
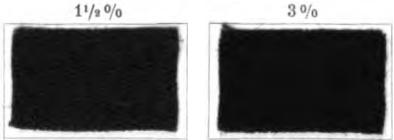
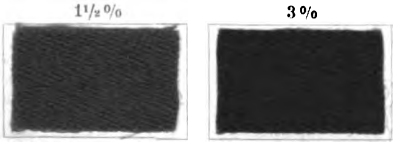
with a Synopsis of their Properties and Fastness.

Regarding the classification into degrees of fastness, "I" denotes the lowest and "IV" the highest standard.

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Thioflavine S pat. 1½ % 3 % 	Normal, as stated on page 79. The baths exhaust well.	II.	IV. The fastness to washing is very good. White wool is not tinted, and white cotton is stained only slightly even when dyeing full shades.	Along with wool: IV; along with cotton: II—III.
Diamine Fast Yellow FF pat. 1½ % 3 % 	Same as with Thioflavine S.	IV. Exceedingly good.	Same as with Thioflavine S.	Along with wool: IV; along with cotton: III.
Diamine Yellow CP 1½ % 3 % 	Same as with Thioflavine S.	IV. Similar to DiamineFast Yellow FF.	IV. Slightly inferior to Thioflavine S.	Along with wool: III—IV; along with cotton: II.
Diamine Gold pat. 1½ % 3 % 	Same as with Thioflavine S.	IV. Similar to DiamineFast Yellow FF.	IV. Same as with Diamine Yellow CP.	Same as with Diamine Yellow CP.
Oxy Diamine Orange G 1½ % 3 % 	Same as with Thioflavine S.	II.	IV. Same as with Diamine Yellow CP.	Same as with Diamine Yellow CP.
Diamine Orange B 1½ % 3 % 	Normal, as stated on page 79, or aftertreated with sulphate of copper as stated on page 80. A subsequent addition of acetic acid is necessary for exhausting the baths.	II—III. When aftertreated with sulphate of copper: IV.	IV. Same as with Diamine Yellow CP.	Same as with Diamine Yellow CP.

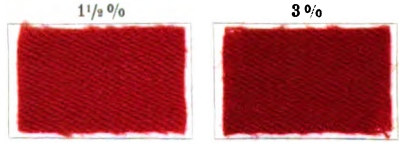
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Silk	Remarks
IV.	IV.	IV.	IV.	Silk is dyed the same depth of shade as the wool.	*Thioflavine S serves for producing lemon yellow shades of good fastness to washing and milling, and is used especially for dyeing flannels and blankets on account of its good resistance to stoving.*
IV.	IV.	IV.	IV.	Same as with Thioflavine S.	*Diamine Fast Yellow FF is distinguished by good fastness to washing, milling, and light, and is used for bright yellows and as a yellowing agent for compound shades.*
IV.	IV.	IV.	IV.	Silk is dyed almost the same depth as the wool.	*Possesses similar good fastness to Diamine Fast Yellow FF, but has a very deep gold shade, and is generally used for golden yellows and as yellowing agent for modes, browns, olives, etc.*
IV.	IV.	IV.	IV.	Silk is only slightly stained.	*Dyes a deeper and redder shade than Diamine Yellow CP and is applied similarly.*
IV.	III. Turns yellower and duller.	III—IV. Turns somewhat yellower and flatter.	IV.	Silk remains considerably paler than wool.	*Oxy Diamine Orange G is used chiefly for dyeing effect threads and blankets.* *Another, somewhat redder brand is the Oxy Diamine Orange R.*
IV.	III—IV. Turns somewhat redder.	IV.	IV.	Silk is dyed as deep as the wool and a slightly redder shade.	*Serves principally in yarn dyeing for shading mode browns.* *When aftertreated with sulphate of copper, the shade turns considerably browner and the fastness to light is materially improved.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Oxy Diamine Brown G 1½ % 3 % 	Same as with Thioflavine S.	II.	Same as with Diamine Yellow CP.	Same as with Diamine Yellow CP.
Diamine Brown 3G pat. 1½ % 3 % 	Same as with Diamine Orange B.	II—III. When aftertreated with sulphate of copper: IV.	Same as with Diamine Yellow CP. Dyeings treated with sulphate of copper are somewhat better still in this respect.	Direct dyeings like those of Diamine Yellow CP. Dyeings aftertreated with sulphate of copper along with wool: IV, along with cotton: II—III.
Diamine Brown R pat. 1½ % 3 % 	Same as with Thioflavine S.	II—III.	Same as with Diamine Yellow CP.	Same as with Diamine Yellow CP.
Diamine Brown M pat. 1½ % 3 %	Same as with Thioflavine S, or aftertreated with sulphate of copper, or bichromate of potash and sulphate of copper as stated on page 80.	II—III. Aftertreated with sulphate of copper: IV. Aftertreated with sulphate of copper and bichromate of potash: III.	Direct dyeings behave like those of Diamine Yellow CP. Dyeings aftertreated with sulphate of copper and bichromate of potash are excellently fast to washing.	Direct dyeings like those of Diamine Yellow CP; dyeings aftertreated with sulphate of copper and bichromate of potash along with wool and cotton: IV.
Diamine Brown B pat. 1½ % 3 % 	Same as with Diamine Brown M.	Same as with Diamine Brown M.	IV. Direct dyeings are already excellent, but when treated with sulphate of copper and bichromate of potash they withstand the severest washing without bleeding.	Direct dyeings same as with Diamine Fast Yellow FF. Dyeings treated with sulphate of copper and bichromate of potash behave excellently beside wool and cotton. IV.
Diamine Catechine G pat. 1½ % 3 % 	Same as with Diamine Orange B, or aftertreated with sulphate of copper, or bichromate of potash and sulphate of copper as stated on page 80.	II. Aftertreated with sulphate of copper: III—IV. Aftertreated with sulphate of copper and bichromate of potash: II—III.	Similar to Diamine Brown M.	Dyed direct same as with Diamine Brown M. Dyeings treated with sulphate of copper and bichromate of potash, along with wool: IV, along with cotton: III.

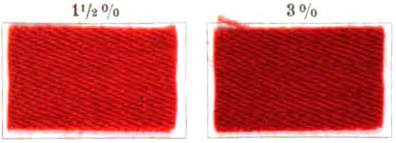
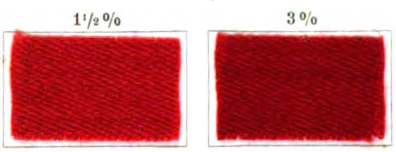
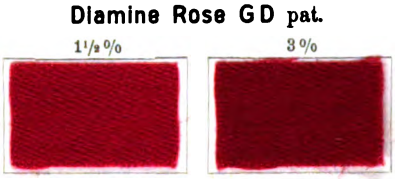
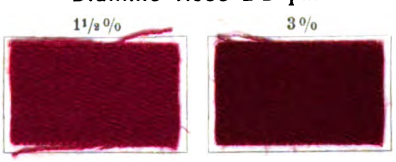
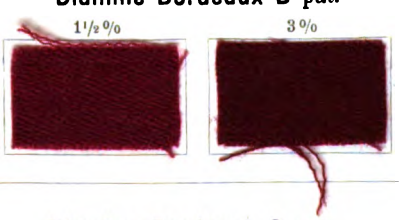
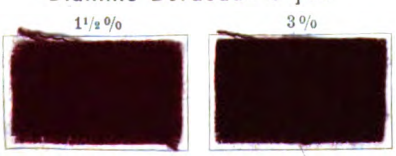
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Silk	Remarks
IV.	II - III. Turns yellower.	III. Turns yellower and duller.	IV. Severe steaming turns the shade yellower: III—IV.	Silk is dyed the same depth of shade as the wool.	*Oxy Diamine Brown G serves, on account of its bright shade, for producing bright reddish oranges and browns, and is used chiefly for knitting yarns.*
IV.	III—IV. Turns somewhat yellower.	IV.	IV.	Silk is dyed almost the same depth as the wool.	*Diamine Brown 3 G is used on yarn and slubbing for the production of mode brown and yellowish brown shades.* *By an aftertreatment with sulphate of copper the shade turns browner, the fastness to milling being noticeably improved and the fastness to light very considerably so.*
IV.	II.	IV. Rinsed with water only, the shade is flatter, but when neutralised with soda, the original shade returns.	On normal steaming: IV. Severe steaming turns the shade redder: II—III.	Silk is dyed the same depth of shade as the wool.	
IV.	IV. Aftertreated dyeings turn somewhat more purple: III.	IV.	IV. Aftertreated dyeings become more purplish on severe steaming: III.	Silk remains considerably paler than wool.	*Very well suited for wool dyeing, and used for producing all kinds of browns and mode shades on yarns, slubbing, loose wool, and shoddy.* *The good resistance of the Diamine Brown M and B dyeings to washing, milling, and light is considerably more improved by an aftertreatment with sulphate of copper and bichromate of potash. The shade is thereby turned somewhat yellower.*
IV.	IV. Same as with Diamine Brown M.	IV. Aftertreated dyeings become somewhat deeper: III.	IV. Same as with Diamine Brown M.		
IV.	III—IV. Turns somewhat paler.	IV.	On normal steaming: IV. On severe steaming: II—III. Aftertreated dyeings: IV.	Silk is dyed the same depth of shade as the wool.	*Yields very fine yellow-brown shades with a full yellow cast, and is used particularly for producing so-called tan shades on knitting yarns.* *By an aftertreatment with sulphate of copper, or sulphate of copper and bichromate of potash, the fastness to milling and light is improved and the shade turned slightly yellower.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Diamine Fast Red F pat. 1½ % 3 % 	Normal, as stated on page 79, or aftertreated with bichromate of potash or chromium fluoride as stated on page 80. The baths exhaust well.	IV. Exceedingly good. The direct dyeings are somewhat superior to the chromed dyeings.	IV. The fastness to washing is very good. White wool is not stained and white cotton only slightly so. The fastness is materially improved by an aftertreatment with chromium fluoride or bichromate of potash.	Beside white wool: III—IV. Beside white cotton: II. When aftertreated with chromium fluoride: IV or III respectively. When aftertreated with bichromate of potash, exceedingly fast to milling, IV.
Diamine Scarlet B pat. 1½ % 3 % 	Same as with Thioflavine S.	III—IV.	IV. The fastness to washing is very good. White wool is not stained, and white cotton only slightly tinted.	Along with wool: III—VI. Along with cotton: I—II.
Diamine Scarlet 3B pat. 1½ % 3 % 	Same as with Thioflavine S.	III—IV.	Same as with Diamine Scarlet B.	Same as with Diamine Scarlet B.
Diamine Brilliant Scarlet S 1½ % 3 % 	Normal, as stated on page 79. Some acetic acid should be added subsequently in order to exhaust the baths.	III—IV.	Same as with Diamine Scarlet B.	Same as with Diamine Scarlet B.
Diamine Red 4B 1½ % 3 % 	Same as with Thioflavine S.	II—III.	Slightly superior to that of Diamine Scarlet B.	Somewhat better than that of Diamine Scarlet B.
Diamine Red 10B pat. 1½ % 3 % 	Same as with Thioflavine S.	II.	Same as with Diamine Scarlet B.	Same as with Diamine Scarlet B.

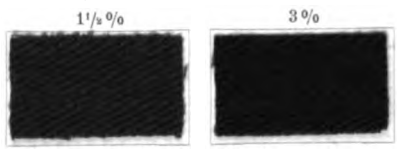
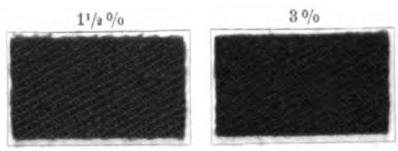
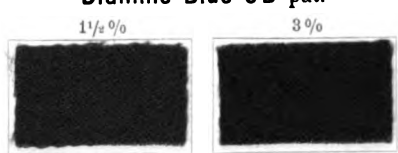
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Silk	Remarks
IV.	IV.	IV.	IV.	Silk remains somewhat paler than wool.	*Diamine Fast Red F is one of the fastest red dyestuffs in point of fastness to light, and may be fixed completely fast to milling with chromium fluoride or bichromate of potash so as to withstand even a severe cloth milling. It is used most extensively for the production of fast shades similar to madder on all kinds of materials; in the most important States it is approved and employed for dyeing red cloth for military trousers. Over alizarine red and madder, Diamine Fast Red F offers the great advantage of very good fastness to carbonising and rubbing, and imparting to the dyed material a very agreeable soft feel, on account of its more simple and rapid method of dyeing.*
IV.	III. Turns duller.	IV.	IV. Severe steaming turns the shade somewhat duller: III.	Silk is dyed as deep a shade as wool.	*On account of its bright shade and good fastness to light, washing and milling, Diamine Scarlet B is applied to a considerable extent for knitting yarns and for milled articles, especially in the flannel and blanket industry.* *It is superior to the ordinary Brilliant Scarlet both in fastness to washing, milling and water, and in respect to fastness to light.*
IV.	IV.	IV.	IV.	Same as with Diamine Fast Red F.	*Diamine Scarlet 3B differs from the "B" brand in its bluer shade and good fastness to stoving; it is applied in a similar manner.*
IV.	IV.	IV. The original shade reappears unchanged on neutralising with soda.	IV.	Silk is stained only slightly.	*Diamine Brilliant Scarlet S is applied for the same purposes as Diamine Scarlet B. It is not quite so bright as the latter, but it has a good fastness to stoving and is somewhat cheaper.*
IV.	III—IV. Turns somewhat yellower.	IV. Same as with Diamine Brilliant Scarlet S.	IV.	Silk remains noticeably paler than wool.	*Both colours are chiefly used for cheap dyeings which are not required to be particularly fast to light and acids. They are used for various purposes, such as for dyeing cheap red to bluish-red shades fast to washing, on knitting yarns.*
IV.	IV.	IV. Same as with Diamine Brilliant Scarlet S.	IV.	Silk is stained only slightly.	*Diamine Red 4B is not quite so bright as Diamine Scarlet B; Diamine Red 10B dyes a bright, bluish red.* *Another brand, Diamine Red 6B, stands in shade between Diamine Red 4B and 10B.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Diamine Purpurine B 1½ % 3 % 	Same as with Thioflavine S.	II—III.	IV. Bleeds on to cotton still less than Diamine Red 4 B.	Along with wool: IV. Along with cotton: II—III.
Diamine Purpurine 3 B 1½ % 3 % 	Same as with Thioflavine S.	II—III.	Same as with Diamine Purpurine B.	Along with wool: IV. Along with cotton: II.
Diamine Rose G D pat. 1½ % 3 % 	Normal, as stated on page 79. The baths exhaust fairly well.	II—III.	IV. Not quite so good as that of Diamine Scarlet.	With respect to bleeding the dyeings behave like those of Diamine Scarlet. The shade is dulled a little by milling.
Diamine Rose B D pat. 1½ % 3 % 	Same as with Diamine Rose G D.	II—III.		
Diamine Bordeaux B pat. 1½ % 3 % 	Same as with Thioflavine S.	III—IV.	Same as with Diamine Scarlet.	Same as with Diamine Scarlet.
Diamine Bordeaux S pat. 1½ % 3 % 	Same as with Thioflavine S.	II—III.		

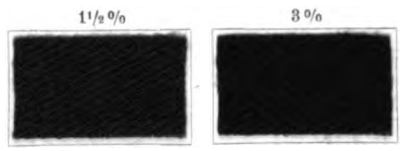
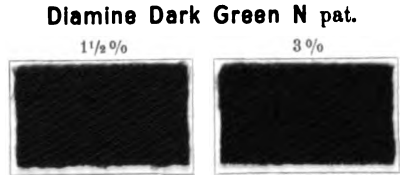
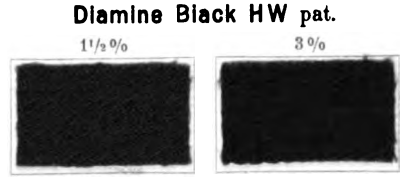
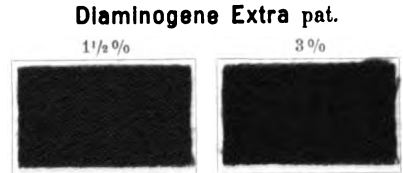
Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Silk	Remarks
IV.	IV.	IV. Same as with Diamine Red 4B.	IV.	Silk remains noticeably paler than wool.	*Of the bright red Diamine Colours, Diamine Purpurine B possesses the best fastness to washing and milling.* *As its dyeings are also fast to stoving, it is frequently applied in the flannel and blanket industries especially.*
IV.	IV.	IV. Same as with Diamine Red 4B.	IV.	Silk is only slightly stained.	*Diamine Purpurine 3B dyes a somewhat bluer shade than the B brand and is applied in a similar manner.* *A still bluer brand is Diamine Purpurine 6B.*
IV.	IV.	IV.	IV.	Silk remains somewhat paler than wool.	*Both these brands are used chiefly for the production of pink shades of slubbing and yarns.* *The dyeings may be brightened with Rosazeine B, which likewise exhausts well in neutral or dilute acetic acid baths.* *A third brand, Diamine Rose BG, ranges in shade between the GD and BD brands.*
IV.	IV.	IV.	IV.	Silk remains noticeably paler than wool.	
IV.	I.	IV. Same as with Diamine Red 4B.	IV.	Same as with Diamine Rose BD.	*Diamine Bordeaux B is used for the production of claret and prune shades on yarns, slubbing, loose wool, and shoddy which are fast to light, washing, and milling.*
IV.	IV.	IV.	IV.	Silk is dyed as deep a shade as wool.	*Diamine Bordeaux S possesses very good fastness to stoving and acids, and is applied similarly to the "B" brand.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Diamine Violet N pat.	Normal, as stated on page 79. The baths exhaust very well.	IV. Exceedingly good.	IV. Very good. White wool is not tinted at all, white cotton is only slightly stained.	Along with wool: IV. Along with cotton: II—III.
Oxy Diamine Violet B pat. 	Same as with Diamine Violet N.	III.	IV. Bleeds on to cotton a little more than Diamine Violet N.	Along with wool: IV. Along with cotton: II.
Diamine Sky Blue FF pat. 	Dye according to method described on page 79, adding gradually, after ½ hour's boiling, 3—5 % acetic acid. After exhausting the bath, the dyeings may be aftertreated with sulphate of copper, as mentioned on page 80.	I—II. Dyeings treated with sulphate of copper: IV. Exceedingly good; same as Indigo.	III—IV. Very good. White wool is not stained; white cotton is slightly stained. By aftertreating the dyeings with sulphate of copper the fastness is considerably improved. IV.	Direct dyeings along with wool: IV, along with cotton: I—II. Dyeings aftertreated with sulphate of copper along with wool: IV, along with cotton: III.
Diamine Blue RW pat.	Same as with Diamine Violet N, or, if necessary, by aftertreating with sulphate of copper, as stated on page 79.	I—II. Dyeings treated with sulphate of copper: IV. Exceedingly good; same as Indigo.	IV. Very good. White wool is not stained; white cotton is scarcely tinted, even in the case of deep shades.	Direct dyeings along with wool IV, along with cotton II—III. Dyeings aftertreated with sulphate of copper along with wool: IV, along with cotton III—IV.
Diamine Blue 3B pat. 	Dye according to instructions on page 79, gradually adding 3—5 % acetic acid after ½ hour's boiling.	I—II.	III—IV. Like that of direct dyeings of Diamine Sky Blue FF.	Along with wool: IV. Along with cotton: I—II.
Diamine Steel Blue L pat.	Same as with Diamine Violet N.	II.	IV. Like that of direct dyeings of Diamine Blue RW.	Along with wool: IV. Along with cotton: II—III.

Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Silk	Remarks
IV.	IV.	IV.	IV.	Silk remains considerably paler in shade than wool.	*Diamine Violet N serves for producing very fast reddish violets, and for shading claret, mulberry and prune shades.* *On account of its very good fastness to light and washing, it is also used as a bottom for Indigo dyeings.*
IV.	IV.	IV.	IV.	Silk is dyed somewhat lighter than wool.	*Being of a duller and more covered shade than Diamine Violet N, Oxy Diamine Violet B is used chiefly for dyeing cheap purples, mulberry and prune shades on yarns.* *Two further brands, Oxy Diamine Violet R and G, dye more yellowish and more reddish yellow shades respectively which possess like properties.*
IV.	IV. Dyeings treated with sulphate of copper turn somewhat more purplish: III.	IV. Dyeings treated with sulphate of copper become bluer.	IV. Dyeings treated with sulphate of copper turn somewhat more greyish on severe steaming: II—III.	Silk remains considerably paler than wool.	*Diamine Sky Blue FF is used principally in the flannel and blanket industries for light blue shades fast to stoving.* *By aftertreating with sulphate of copper, it yields greenish blue shades which are very fast to washing and exceedingly fast to light.*
IV.	IV. Dyeings treated with sulphate of copper turn somewhat more purplish: III.	IV. Dyeings treated with sulphate of copper become bluer.	IV. Dyeings treated with sulphate of copper become somewhat duller on severe steaming: II—III.	Silk is dyed the same depth of shade as wool.	*On account of its very good fastness to washing, milling, and stoving, Diamine Blue RW is used principally for navy blues on knitting yarns and yarns for flannels and blankets.* *By an aftertreatment with sulphate of copper the shade becomes more greenish and is materially improved, especially in fastness to light.*
IV.	IV.	IV.	IV.	Silk is only slightly stained.	*In fastness similar to Diamine Sky Blue FF dyed direct, and applied in the same manner.* *An aftertreatment with sulphate of copper affects neither its shade nor properties of fastness.* *The two more reddish brands, Diamine Blue BB and BX, behave like Diamine Blue 3B.*
IV.	IV.	IV.	IV.	Silk is dyed the same depth as wool.	*Serves for the production of steel blues of very good fastness to washing, and for shading greens and olives on yarns and shoddy.*

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Diamine Green G pat. 1½ % 3 %	Same as with Diamine Violet N. Diamine Green G may also be treated with chromium fluoride according to instructions on page 80.	III—IV. Dyeings treated with chromium fluoride: III.	IV. Very good. White wool is not stained, white cotton is scarcely tinted, even by very deep shades. Aftertreated with chromium fluoride, the dyeings answer the highest requirements.	Direct dyeings along with wool: IV; along with cotton: II—III. Dyeings treated with chromium fluoride, along with wool: IV; along with cotton: III—IV.
Diamine Green B pat. 1½ % 3 % 	Same as with Diamine Violet N.	III—IV.	Same as with Diamine Green G not aftertreated.	Along with wool: IV; along with cotton: II—III.
Diamine Dark Green N pat. 1½ % 3 % 	Same as with Diamine Violet N.	III.	Same as with Diamine Green B.	Same as with Diamine Green B.
Diamine Black HW pat. 1½ % 3 % 	Normal, according to instructions given on page 79. The baths exhaust fairly well.	III.	Same as with Diamine Green B.	Same as with Diamine Green B.
Diaminogene Extra pat. 1½ % 3 % 	Same as with Diamine Violet N. Diaminogene extra may also be treated with chromium fluoride according to instructions on page 80.	III.	Similar to that of Diamine Green B. The fastness is somewhat improved by an aftertreatment with bichromate of potash.	Direct dyeings along with wool: IV; along with cotton: II—III. Dyeings treated with bichromate of potash along with wool: IV; along with cotton: III.
Diamine Jet Black OO pat. 1½ % 3 %	Same as with Diamine Black HW. Diamine Jet Black OO may also be treated with bichromate of potash according to instructions on page 80.	II—III.	Direct and chromed dyeings behave like those of Diaminogene Extra, dyed direct or chromed.	Direct and afterchromed dyeings behave like corresponding dyeings of Diaminogene Extra.

Colours

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Silk	Remarks
IV.	IV.	IV.	IV. Severe steaming turns the shade yellower: III.	Silk is not dyed quite so deep as wool.	*Diamine Green G is used extensively for the production of green and olive shades, required to be fast to light, washing, and milling, on yarns, loose wool, and especially on shoddy.* *By an aftertreatment with chromium fluoride the fastness to milling is so much increased as to render the dyeings resistant even to a severe milling.*
III—IV. Turns somewhat browner.	IV.	IV.	Same as with Diamine Green G.	Silk is dyed the same depth as wool.	*Diamine Green B is somewhat bluer in shade than Diamine Green G dyed direct and possesses the same fastness; it is also applied in a like manner.* *An aftertreatment with chromium fluoride has no effect on the fastness of Diamine Green B.*
IV.	IV.	IV.	IV.	Same as with Diamine Green B.	*Differs from the Diamine Green B principally in its more covered and somewhat bluer shade.*
IV.	IV.	IV.	IV.	Silk is dyed a little deeper than wool.	*Diamine Black H W is used for greenish slates and for saddening steel blues, Russian greens and dark browns on knitting yarn, woollen and worsted yarns, and on loose stock.*
IV.	II—III. Turns greyer and somewhat redder.	IV.	On normal steaming: IV; on severe steaming: II.	Silk is only slightly stained.	*Diaminogene Extra possesses very good fastness to washing, milling, and light, and levels very well. It is used for grey shades and as a saddening agent for mode shades, browns, blues, etc. on yarn, slubbing, loose wool, and shoddy.* *Its fastness to washing and milling may be still further improved by an aftertreatment with bichromate of potash; the shade thereby becomes a little duller.*
IV.	III. Turns bluer.	III. Turns bluer.	On normal steaming: IV; on severe steaming: II—III.	Silk remains considerably paler than wool.	*Serves for reddish greys and for saddening browns and dark blues.* *The fastness to washing and milling of the dyeings may be increased by afterchroming, similarly to that of dyeings of Diaminogene Extra, the shade thereby becoming a little redder.*

D. Eosine Colours.

Eosine Colours.

Eosine Colours are used chiefly for producing pinks and exceptionally bright reds on woollen yarn, especially on Berlin wool and "sulphured" or stoved yarn, and also on flannels and blankets. They are likewise employed in silk dyeing for producing fluorescent shades. The dyeings are very fast to washing, alkalies, acids, and stoving, but only moderately fast to light.

Dissolving the Dyestuffs.

Eosine Colours are dissolved by mixing with boiling water (see page 2).

Process of Dyeing.

Method I. Dye with the addition of

5 % acetic acid;

enter at about 50—60° C. (120—140 deg. F.), raise the bath to the boil within 1/2 hour, and allow to boil gently for another 1/2 hour. In order to better exhaust the bath, a little more acetic acid may if necessary be added subsequently when dyeing heavier shades, the goods then still being worked for a short time at the simmer.

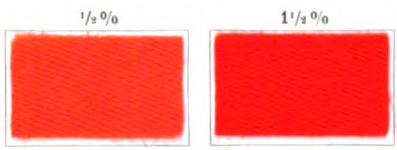
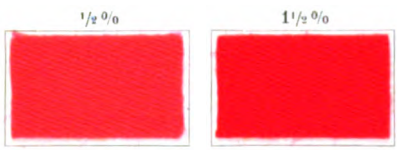
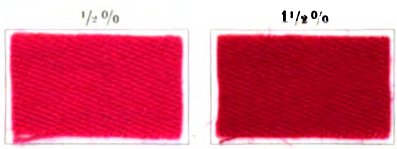
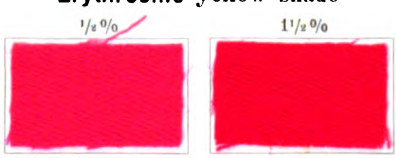
Method II. Specially brilliant shades are obtained when working according to this method as follows:

The bath is prepared with

5 % acetic acid,
5 % alum and
3 % tartar.

The wool is boiled for half an hour in this bath, which is then allowed to cool down to about 50° C. (120 deg. F.); after adding the dyestuff solution, the bath is again brought slowly to the boil and kept boiling for 1/4 hour. Should the bath then not be exhausted, some more acetic acid must be added.

Eosine

Name of the Colour	Method of Dyeing	Fastness to Light	Fastness to Washing	Fastness to Milling
Eosine GGG 	Dye with the addition of 5 % acetic acid or on a mordant of alum, tartar and acetic acid according to instructions on page 97.	I.	III–IV. The dyeings withstand a neutral washing very well.	II–III The dyeings withstand a light milling.
Eosine GGF 		I.		
Eosine Scarlet B 		I – II.		
Erythrosine yellow shade 		I.	III–IV. Somewhat better than Eosine.	III. The dyeings withstand a light to medium milling sufficiently well.
Phloxine (No. 749)		I.		
Rose Bengale extra N		I.		

Colours.

Fastness to Alkalies	Fastness to Stoving	Fastness to Carbonising	Fastness to Steaming	Staining of Cotton and Silk Effect Threads	Remarks
IV.	IV. Severe stoving changes the shade a little towards yellow.	III - IV. The shade is turned somewhat yellower.	IV.	Cotton and silk are not stained.	*Eosine G G G is the yellowest brand and serves for red shades of orange and for shading the other Eosine brands.*
IV.	IV.	IV.	IV.	Same as with Eosine G G F.	*Eosine GGF is the principal brand for yellowish reds.* *Eosine L is another, somewhat more bluish, Eosine B N a considerably more bluish, brand.*
IV.	IV.	IV.	IV. Severe steaming turns the shade a little more bluish; III.	Same as with Eosine G G F.	*In shade resembling the Eosine B N, but more covered and not quite so bright; it evinces less tendency towards fluorescing on the fibre.*
IV.	IV.	IV.	Same as with Eosine Scarlet B.	Cotton is not stained, silk only very slightly so.	*Yields very clear reds, with a bluish cast, of excellent fastness to washing and milling.* *Other more bluish brands are: Erythrosine D, extra N and B.*
IV.	IV.	IV.	IV.	Same as with Erythrosine yellow shade.	*Phloxine (No. 749) possesses the same properties as the Erythrosines but a more bluish and very brilliant shade.* *The other brand called Phloxine S only differs from "749" in not possessing quite the same tinctorial power.*
IV.	IV	IV.	Same as with Eosine Scarlet B.	Cotton is not stained, silk however noticeably so.	*Rose Bengale extra N is the bluest of the Eosines.*

E. Basic Colours.

Basic Colours.

Basic colours are chiefly used for producing brilliant shades ("sulphured" or stoved colours) in the dyeing of Berlin wool, also for dyeing very cheap colours on flannels, blankets, and shoddies.

Dissolving the Dyestuffs.

Basic colours are dissolved by mixing with boiling water, corrected if necessary with an addition of acetic acid (see also page 2).

Process of Dyeing.

Method I. Generally speaking, basic colours are dyed on wool in pure water acidulated with acetic acid in order to neutralise the lime. This addition is almost imperative in the case of Solid Green and Brilliant Green. The wool is entered at about 40° C. (105 deg. F.) and the bath brought up to 80 or 90° C. (175—195 deg. F.), at which temperature the material is treated for 20—30 minutes.

Method II is employed for pale, "sulphured" or stoved colours, and is applied in the first instance for

Thioflavine T
Irisamine G
Methyl Violet 6B—3B
Crystal Violet 5B bluish
Victoria Blue B.

A soap bath is prepared containing

3—8 oz curd soap or olive-oil soap per 10 gallons (according to the hardness of the water);

the dyestuff is added in solution, the goods being then entered at about 40—50°C. (105—120 deg. F.) and dyed for about ½ hour. The yarn is then lifted, hydroextracted, and stoved overnight in the sulphur stove.

Method III applies to Solid Green and Brilliant Green only, which thus yield richer shades.

For 10 lbs wool, dissolve

2 lbs sodium thiosulphate (hyposulphite of soda crystals) and
1 lb alum

in the dye beck, and when they are completely dissolved, add

6½ oz sulphuric acid.

Enter the yarn at 40° C. (105 deg. F.) into the bath which will have assumed a milky appearance, raise slowly to 80° C. (175 deg. F.), work the yarn for about one hour, rinse thoroughly in water, and add ½ gallon of ammonia per 100 gallons of the final rinsing water. The dyeing is done according to method I at 80—90° C. (175—195 deg. F.) in a bath weakly acidulated with acetic acid.

Basic colours are used on wool chiefly on account of their brightness and great tinctorial power. Generally speaking they are fairly fast to washing and (with the exception of Malachite Green and Brilliant Green) fast to sulphur stoving, but not very fast to light; they are besides liable to rub off.

The most important basic colours for wool are:

Thioflavine T
Tannin Orange R
Chrysoïdine (all brands)
†Magenta Ia Diamond
†Cerise Ia
Russian Red B, G
†Magenta yellow shade
*Methyl Violet 6B—2B
†Methyl Violet B—4R
*Crystal Violet 5B bluish
*Victoria Blue B
*New Methylene Blue N, NSS
Solid Green
Malachite Green
Brilliant Green
*Irisamine G
*Thioflavine T
Tannin Orange R
†Chrysoïdine (all brands)
†Bismarck Brown (all brands)
Aniline Brown.

The dyestuffs marked with an asterisk (*) are fast to stoving, those marked † fairly fast in this respect.

Special Part.

The Dyeing of Loose Wool.

Our

Anthracene Chrome Black, patented,

bears further the abbreviated name of

"Crown Black"

and is also under this denomination very well known to the trade.

The different brands may be referred to equally well as:

Crown Black F	or Anthracene Chrome Black F
Crown Black FE	or Anthracene Chrome Black FE
Crown Black 5B	or Anthracene Chrome Black 5B
Crown Black P extra	or Anthracene Chrome Black P extra
Crown Black PR extra	or Anthracene Chrome Black PR extra
Crown Black PF extra	or Anthracene Chrome Black PF extra.

Special Part.

The Dyeing of Loose Wool.

The Dyeing of Woollen and Worsted Yarns.

General remarks.

Woollen and worsted yarns are mostly dyed in hank form in the ordinary dye vat, but sometimes also in dyeing machines. Machine-dyeing has proved especially useful for knitting yarn, Berlin wool and other yarns with a tendency to felt. Of late, yarn is likewise dyed in machines in the shape of cops. For details of working we refer to the subsequent respective chapter.

Treatment with boiling water.

Most yarns are boiled previous to washing, to prevent felting and curling, and to allow of an easy reeling off. Either the bundled yarn, just as it comes from the spinner, is put into boiling hot water (best condensed water), and left to cool over night, or, the yarn is stretched on stretching frames, submerged for a few minutes in boiling hot water, and allowed to cool in the stretched state.

Greasy yarns should be thoroughly washed after boiling. Yarns which are not boiled must also be degreased well before dyeing.

The scouring is done at 35—45° (95—115 deg. F.) with the addition of about 3 % soda or ammonia, and 4 % soap, of the weight of the yarn. Yarns containing unsaponifiable oil (mineral oil) require more soap and soda and a higher temperature of the scouring liquor. The yarn is worked for about ¼ hour in the scouring bath, well rinsed in water, hydroextracted, and is then ready to be dyed.

Knitting and hosiery yarns intended to be dyed black are sometimes degreased after dyeing by rinsing in a lukewarm bath containing 2 % soda (of the weight of the yarn), and soaped at 45° C. (115 deg. F.) in as soft water as possible (best condensed water) with 10 % neutral soap; they are then thoroughly hydroextracted and dried without rinsing. Yarns so treated possess a high degree of lustre and soft handle, and can be worked up well.

Dye Vessels. Yarns in the hank are as a rule dyed in rectangular wooden vats, a little higher than the reel of the hanks to be dyed.

Steam Pipes. Open or closed steam pipes of copper*) or hard lead are used for heating the vats; iron pipes are less suitable. Tinned pipes, or tinned vats, are not so serviceable, because many colours are destroyed by tin in the presence of acids. The vertical parts of the steam pipes passing down into the vat and the draining pipe of closed steam coils are cased off by wooden lattices in order to prevent the yarn from coming into contact with the hot steam pipes. The horizontal parts of the pipes are frequently covered with a perforated false bottom, which also protects the yarns from coming into contact with the hot metal and prevents the steam from acting directly on the material.

Volume of Water. The vats should be of a capacity to hold a volume of water corresponding to about 40 times the weight of the yarn to be dyed, e. g. about 400 gallons for every 100 lbs.

Details of dyeing will be found in the general part of this book. The yarn is loosely tied, put on smooth sticks, about 2—3 lbs per stick, and turned by hand or with a broaching stick.

Dyestuffs for Yarn. According to requirements, the following groups of colours are used for dyeing:

1. Acid Colours.
2. Anthracene Chrome and Anthracene Acid Colours, if necessary shaded with Formyl Violet, Formyl Blue, Brilliant Milling Blue, Brilliant Milling Green B, Milling Yellow, Milling Red, Wool Red and Rosazeïne.
3. Diamine Colours.
4. Basic Colours and Eosines.

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*) When dyeing colours sensitive to copper, the bath is heated first to 60° C. (140 deg. F.), charged with $1/4-1/2$% sulphocyanide of ammonia (of the weight of the goods), and allowed to stand for a little while before adding the dyestuff.

The Acid Colours are very extensively employed for many kinds of yarn, and serve especially for dyeing fancy yarns, Berlin wool, carpet and embroidery yarns and also knitting yarns.

Some Acid Colours, such as Milling Yellow, Formyl Violet, Brilliant Milling Blue, Alkaline Blue, Brilliant Milling Green, Anthracite Black, Naphtyl Blue Black, Naphtylamine Black and others possess very good resistance to washing and milling, and are for this reason extensively employed for goods subjected to milling or washing.

Chrome Colours (Anthracene Chrome and Anthracene Acid Colours) are preferred for dyeing goods which are required to possess the best possible fastness to milling and light, e. g. for better class weaving yarns (worsted yarns, woollen yarns, cheviot yarns, etc.)

The Diamine Colours are extensively employed for dyeing shades fast to washing and milling — especially for pale compound shades, yellows, reds, clarets and greens — chiefly on knitting and hosiery yarns, yarns for flannels and blankets, and others. For machine-dyeing they are also in great favour owing to their simple method of dyeing.

The Basic Colours and Eosines are principally used on Berlin wool for dyeing bright shades, such as red, green, etc. and for light "sulphurised" colours (i. e. colours stoved after dyeing).

Stripping coloured Shoddy Yarns.

For details of stripping yarns manufactured of coloured shoddy we refer to the instructions given on page 135 for the stripping of coloured shoddies.

Methods of Dyeing.

Method 1a.

A. For levelling colours (page 6):

Naphtol Yellow S, Fast Yellow S, Acid Yellow AT, Indian Yellow, Metanil Yellow, Tropaeoline, Orange GG, II, IV, extra, R, Lanafuchsine, Acid Magenta, Azo Orseille, Brilliant Orseille, Cyanole, Tetra Cyanole, Thiocarmine, Cyanole Green, Cyanole Fast Green, Acid Green, Fast Acid Green, Acid Violet, Azo Wool Violet, Azo Wool Blue, Azo Navy Blue, Acid Navy Blue, Indigo Blue and Azo Merino Black.

The method of dyeing is the same as stated for loose wool on page 109.

B. For ordinary acid colours:

Orange EN and ENZ, Scarlet, Brilliant Scarlet, Crystal Scarlet, Brilliant Cochineal, Brilliant Croceïne, Croceïne AZ, Naphtol Red, Amaranth, Roccelline, Azo Red, Azo Rubine, Naphtol Green, Peri Wool Blue, Water Blue, Wool Blue, Naphtol Black, Naphtol Blue Black and the Naphtylamine Blacks of the S series.

The method of dyeing is the same as for the above mentioned levelling colours (sub A). Dyeing is however advantageously commenced with only about half the quantity of acid, the rest being added after 1/2 hour's boiling.

Method 1b.

For Milling Yellow, Milling Red, Wool Red, Eosine, Rosazeïne, Formyl Violet, Alkaline Violet, Formyl Blue, Brilliant Milling Blue, Brilliant Milling Green and Anthracite Black.

Method 1c.

For Lanacyl Colours, Naphtol Blue and the Naphtylamine Blacks of the 4B series.

The method of dyeing is the same as stated for loose wool on page 110, and for Eosines on page 97.

Method 2.

For Naphtyl Blue Black, Naphtylamine Black RNB, NBB and R.

Method 3.

For Alkaline Blue.

The method of dyeing is the same as stated for loose wool on page 110.

Method 4a.

For Anthracene Chrome Blue, Anthracene Chrome Brown, Anthracene Chrome Red, Anthracene Chrome Violet, Anthracene Acid Brown G, Anthracene Yellow BN, Anthracene Acid Black SA, SR, SBB.

Method 4b.

For Anthracene Yellow C, R, GG, Anthracene Acid Brown R, N, B, V, SW.

Method 5.

For Anthracene Chrome Black and Anthracene Acid Black NS, LW, SW.

Method 5a.

For Anthracene Acid Black DSF and DSFB.

Method 6.

For Anthracene Colours dyed on chromed wool.

The method of dyeing is the same as stated for loose wool on pages 111—114.

Method 7.

For Diamine Colours.

Method 8.

For Basic Colours.

The method of dyeing is the same as stated for loose wool on pages 114—115.

Simplest and cheapest method of production

Combinations of:

*Naphtol Yellow S
*Indian Yellow FF
Orange II, extra
*Azo Orseille BB (for pale shades)
*Lanafuchsine SB (for full shades)
Indigo Blue N

or, of better fastness to light, of

*Acid Yellow AT
*Orange GG
Orange II, extra
*Azo Orseille BB (for pale shades)
*Lanafuchsine SB (for full shades)
*Cyanole Green B, 6G
*Tetra Cyanole V.

dyed with bisulphate of soda. (method 1a.)

Still better in fastness to light are combinations of

*Acid Yellow AT
*Orange GG
*Lanafuchsine SG
*Cyanole Fast Green G

The dyestuffs marked with an asterisk (*) level especially well and should therefore be used in the first place for shading in the boiling bath.

The following dyestuffs of the above combinations are the best regarding fastness to light:

Acid Yellow AT
Indian Yellow FF
Orange, all brands
Azo Orseille BB
Lanafuchsine SB, SG
Cyanole Fast Green G
Cyanole Green B, 6G
Tetra Cyanole V.

Of good fastness to washing and milling

a) Of good fastness to washing and milling next to wool and cotton:

Combinations of:

Milling Yellow 0
Milling Red G
Wool Red B
Brilliant Milling Green B
Cyanole Fast Green G

dyed with Glauber's salt and acetic acid. (method 1b.)

or of

Diamine Fast Yellow FF
Diamine Brown M, B
Diamine Catechine G
Diamine Fast Red F
Diaminogene extra

dyed with Glauber's salt and acetate of ammonia, aftertreated with bichromate of potash, or chromium fluoride. (method 7.)

For Greys:

Anthracite Black B
Anthracite Black R

dyed with Glauber's salt and acetic acid. (method 1b.)

Diaminogene extra, dyed as stated above. (method 7.)

b) Of good fastness to washing and milling next to wool:

Combinations of:

Diamine Yellow CP
Diamine Brown M, B
Diamine Catechine G
Diamine Scarlet B, 3B
Diamine Rose BD
Diaminogene extra

dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

The following dyestuffs of the above combinations are the best regarding fastness to light:

Milling Yellow 0
Wool Red B
Cyanole Fast Green G
Diamine Yellow CP
Diamine Fast Yellow FF
Diamine Scarlet B, 3B
Diamine Fast Red F
Diaminogene extra.

The methods of dyeing are given on pages 188—189.

Mode Shades on Woollen Yarn.

Excellently fast to milling and light

A. Combinations of:

Anthracene Yellow BN
Anthracene Acid Brown G
Anthracene Chrome Brown D
Anthracene Chrome Red A
Anthracene Chrome Blue F, BB, G
Anthracene Chrome Violet B

} dyed with Glauber's salt and sulphuric acid, aftertreated with bichromate of potash (method 4a), or on chromed wool. (method 6.)

or

B. Combinations of:

Anthracene Yellow C
Anthracene Acid Brown G, N, B
Anthracene Chrome Red A
Anthracene Chrome Blue F, BB, G

} dyed with Glauber's salt and acetic acid, aftertreated with bichromate of potash (method 4b), or on chromed wool. (method 6.)

When working according to the one-bath method, combinations of the products under A may be dyed direct with sulphuric acid, whilst the combinations referred to under B must be dyed slowly with acetic acid

For pearl shades:

Anthracene Chrome Blue F, BB, G

dyed with the addition of

1—2% chromium fluoride
2—3% acetic acid

or

2—4% chrome-alum
2—3% acetic acid

for ¾—1 hour at the boil.

Special properties of fastness

Dyestuffs fast to steaming:

All the dyestuffs are excellently fast to steaming with the exception of

Anthracite Black B, R
Diamine Catechine G
Diaminogene extra,

the shades of which are slightly changed on severe steaming.

Dyestuffs fast to carbonising:

All the dyestuffs with the exception of

Azo Orseille BB,

the shade of which turns a little bluer.

Dyestuffs fast to stoving:

All the dyestuffs with the exception of

Indigo Blue N
Wool Red B
Diamine Scarlet B
Diaminogene extra
Anthracene Yellow BN
Anthracene Acid Brown G.

Fairly fast to stoving but satisfactory for most purposes are the following:

Milling Red G
Diamine Catechine G
Anthracene Yellow C.

The methods of dyeing are given on pages 188—189.

Simplest and cheapest method of production

Combinations of:

Naphtol Yellow S
Indian Yellow FF
Orange II, extra
Naphtol Red B
Lanafuchsine SG
Indigo Blue N
or of better fastness to light, of
Tropaeoline 00, 0
Acid Yellow AT
Orange IV, II, extra
Lanafuchsine SG
Cyanole Green 6G
Cyanole Fast Green G

dyed with bisulphate of soda. (method 1a.)

The dyestuffs of the last mentioned combinations are noted for their especially good levelling property.

For prune shades:

Combinations of:

Orange II, extra
Azo Wool Violet 7R
Indigo Blue N
Tetra Cyanole V

dyed with bisulphate of soda. (method 1a.)

The following dyestuffs of the above combinations are the best regarding fastness to light:

Orange, all brands
Tropaeoline 00, 0
Indian Yellow FF
Acid Yellow AT
Lanafuchsine SG
Naphtol Red C
Cyanole Green 6G
Cyanole Fast Green G
Azo Wool Violet 7R
Tetra Cyanole V.

Of good fastness to washing and milling

a) Of good fastness to washing and milling next to wool and cotton:

Combinations of:

Milling Yellow 0, 00
Milling Red G
Wool Red BG
Brilliant Milling Green B
Formyl Violet S4B

dyed with Glauber's salt and acetic acid. (method 1b.)

or

Diamine Brown M, B
Diamine Catechine G
Diamine Fast Yellow FF
Diamine Fast Red F
Diaminogene extra
Diamine Violet N

dyed with Glauber's salt and acetate of ammonia, aftertreated with bichromate of potash or chromium fluoride. (method 7.)

b) Of good fastness to washing and milling next to wool:

Combinations of:

Milling Yellow 0, 00
Wool Red B
Cyanole Fast Green B
Formyl Violet S4B

dyed with Glauber's salt and acetic acid. (method 1b.)

or

Diamine Brown R, M, B
Oxy Diamine Brown G
Diamine Catechine G
Diamine Yellow CP
Diamine Scarlet B, 3B
Diaminogene extra
Oxy Diamine Violet B

dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

The following dyestuffs of the above combinations yield dyeings of very good fastness to light:

Milling Yellow 0, 00
Wool Red B
Cyanole Fast Green G
Diamine Fast Yellow FF
Diamine Yellow CP
Diamine Fast Red F
Diamine Scarlet B, 3B
Diaminogene extra
Diamine Violet N
Oxy Diamine Violet B.

The methods of dyeing are given on pages 188—189.

Shades on Woollen Yarn.

Excellently fast to milling and light	Special properties of fastness

A. Combinations of:

Anthracene Chrome Brown D, A
Anthracene Acid Brown G
Anthracene Yellow BN
Anthracene Chrome Red A
Anthracene Chrome Blue G, BB, R
Anthracene Chrome Violet B

} dyed with Glauber's salt and sulphuric acid, aftertreated with bichromate of potash. (method 4a.)

or

B. Combinations of:

Anthracene Acid Brown G, N, B, V
Anthracene Yellow C
Anthracene Chrome Red A
Anthracene Chrome Blue G, BB, R
Anthracene Chrome Violet B

} dyed with Glauber's salt and acetic acid, aftertreated with bichromate of potash. (method 4b.)

By saddening with black dyestuffs considerably cheaper dyeings are obtained which in point of fastness to light are but slightly inferior to the above combinations.

Combinations of the following are for instance used:

Anthracene Acid Brown B, SW, V
Anthracene Yellow C
Anthracene Chrome Black F
Anthracene Acid Black NS, LW

} dyed with Glauber's salt and acetic acid, aftertreated with bichromate of potash. (method 4b.)

Dyestuffs fast to steaming:

All the dyestuffs are excellently fast to steaming with the exception of

Diamine Brown R
Oxy Diamine Brown G
Diamine Catechine G
Diaminogene extra
Anthracene Acid Black LW,

the shade of which is slightly changed on severe steaming.

Dyestuffs fast to carbonising:

All the dyestuffs with the exception of

Oxy Diamine Brown G
Anthracene Acid Black LW.

Fairly fast to carbonising are:

Naphtol Red C
Azo Wool Violet 7R,

which become slightly bluer.

The material must be neutralised thoroughly after carbonising when dyed with one of the following dyestuffs:

Tropaeoline 00
Orange IV
Diamine Brown R.

Dyestuffs fast to stoving:

All the dyestuffs with the exception of

Naphtol Red C
Wool Red B, BG
Indigo Blue N
Diamine Brown R
Oxy Diamine Brown G
Diamine Scarlet B
Diaminogene extra
Anthracene Yellow BN
Anthracene Acid Brown G, SW
Anthracene Acid Black LW.

Fairly fast to stoving and satisfactory for most purposes are the following:

Tropaeoline 00, 0
Orange IV
Milling Red G
Diamine Catechine G
Anthracene Yellow C
Anthracene Acid Black NS.

Simplest and cheapest method of production

For very bright yellows:

Naphtol Yellow S, Acid Yellow AT, Fast Yellow S — dyed with bisulphate of soda. (method 1a.)

or

Thioflavine T — dyed with some acetic acid (method 8), or, for pale shades in a soap bath and then stoved (page 120).

For deeper yellows:

Metanil Yellow, Tropaeoline 0, 00, G, Orange IV, Indian Yellow, G, R, FF — dyed with bisulphate of soda. (method 1a.)

Orange GG, II, extra, R; Orange EN, ENZ — dyed with bisulphate of soda. (method 1a.)

or

Tannin Orange R — dyed with some acetic acid. (method 8.)

For very bright oranges:

Combinations of:

Naphtol Yellow S, Acid Yellow AT, Rosazeïne B, 13 — dyed with bisulphate of soda. (method 1a.)

or

Thioflavine T, Rosazeïne B, 13, Irisamine G — dyed with some acetic acid (method 8), or, for pale shades in a soap bath and then stoved (page 210).

The following dyestuffs of the above combinations yield dyeings of very good fastness to light:

Acid Yellow AT	Tropaeoline, all brands
Fast Yellow S	Indian Yellow R, FF
Metanil Yellow	Orange, all brands.

Of good fastness to washing and milling

Yellow.

a) Of good fastness to washing and milling next to wool and cotton:

Milling Yellow 0, Milling Yellow 00 — dyed with Glauber's salt and acetic acid. (method 7.)

b) Of good fastness to washing and milling next to wool:

Thioflavine S, Diamine Fast Yellow FF, Diamine Yellow CP, Diamine Gold — dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

Orange.

a) Of good fastness to washing and milling next to wool and cotton:

Combinations of:

Milling Yellow 0, 00; Milling Red G — dyed with Glauber's salt and acetic acid. (method 1b.)

For very bright oranges:

Milling Yellow 0, 00; Rosazeïne B, 13 — dyed with Glauber's salt and acetic acid. (method 1b.)

b) Of good fastness to washing and milling next to wool:

Oxy Diamine Orange G, R; Diamine Orange B

or,

combinations of:

Diamine Yellow CP, Diamine Scarlet B, Diamine Purpurine B, Rosazeïne B, 13 — dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

The following dyestuffs of the above combinations yield dyeings of very good fastness to light:

Milling Yellow 0, 00	Diamine Gold
Diamine Fast Yellow FF	Diamine Scarlet B.
Diamine Yellow CP	

Orange Shades on Woollen Yarn.

Excellently fast to milling and light

Anthracene Yellow BN
Anthracene Yellow C
Anthracene Yellow R
} dyed with Glauber's salt and acetic acid, after-treated with bichromate of potash. (method 4 b.)

For greenish yellows:

Anthracene Yellow GG,
dyed with Glauber's salt and acetic acid, after-treated with chromium fluoride. (method 4 b.)

Combinations of:

Anthracene Yellow BN
Anthracene Yellow C
Anthracene Yellow R
Diamine Fast Red F
} dyed with Glauber's salt and acetic acid, after-treated with bichromate of potash. (method 4 b.)

Special properties of fastness

Dyestuffs fast to steaming:

All the dyestuffs are excellently fast to steaming with the exception of

Thioflavine T,

the shade of wich is dulled by severe steaming.

Dyestuffs fast to carbonising:

All the dyestuffs with the exception of

Thioflavine T
Tannin Orange R
Irisamine G
Oxy Diamine Orange G, R.

The material must be thoroughly neutralised after carbonising when dyed with one of the following dyestuffs:

Fast Yellow S
Metanil Yellow
Tropaeoline 00, G
Orange IV
Diamine Purpurine B.

Dyestuffs fast to stoving:

All the dyestuffs with the exception of

Fast Yellow S
Anthracene Yellow BN
Oxy Diamine Orange G, R
Diamine Scarlet B
Tannin Orange R.

Fairly fast to stoving and satisfactory for most purposes are the following:

Metanil Yellow
Tropaeoline, all brands
Orange IV
Milling Red G
Anthracene Yellow C, R, GG
Diamine Orange B.

The methods of dyeing are given on pages 188 and 189.

Simplest and cheapest method of production

For bright reds:

Brilliant Scarlet, all brands
Crystal Scarlet 6R
Scarlet FR, F2R, F3R
Brilliant Cochineal 2R, 4R
Lanafuchsine SG, SB
} dyed with Glauber's salt and sulphuric acid. (method 1a.)

For specially brilliant, light reds:

Combinations of:

Rosazeïne B
Orange extra
Naphtol Yellow S
} dyed with Glauber's salt and sulphuric acid, and, if necessary, stoved. (method 1a.)

For deep reds:

Scarlet EC
Naphtol Red EB
Roccelline
Azo Rubine A
} dyed with bisulphate of soda. (method 1a.)

For shades very fast to light on carpet yarn, yarn for upholstery, etc.:

Brilliant Croceïne, all brands, dyed with bisulphate of soda. (method 1a.)

Rosazeïne B, 13
Irisamine G
Eosines, all brands
} dyed with acetic acid, if necessary stoved. (method 1b.) Pale shades are also dyed in the soap bath and then stoved. (see page 210.)

For very cheap pinks:

Magenta Ia. Diamond
Magenta yellow shade
} dyed with some acetic acid. (method 8.)

The following dyestuffs of the above combinations yield dyeings of very good fastness to light:

Brilliant Croceïne, all brands (exceedingly good)
Brilliant Scarlet, all brands
Crystal Scarlet 6R
Scarlet FR—F3R
Brilliant Cochineal 2R, 4R
Naphtol Red EB
Lanafuchsine SG, SB
Azo Rubine A.

Of good fastness to washing and milling

Red.

a) Of good fastness to washing and milling next to wool and cotton:

Milling Red G
Milling Red FR
Wool Red BG
if necessary shaded with
Rosazeïne B, 13
} dyed with Glauber's salt and acetic acid. (method 1b.)

b) Of good fastness to washing and milling next to wool:

Diamine Red 4B, 6B
Diamine Purpurine B, 3B, 6B
Diamine Scarlet B, 3B
Diamine Brilliant Scarlet S
Diamine Fast Red F (direct)
} dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

Satisfactory for many articles are:

Scarlet FR, F2R, F3R
Scarlet EC
} dyed with Glauber's salt and sulphuric acid. (method 1a.)

Pink.

a) Of good fastness to washing and milling next to wool and cotton:

Rosazeïne B, 13
Irisamine G
} dyed as stated alongside (in the first column).

b) Of good fastness to washing and milling next to wool:

Diamine Rose BD, GD
Diamine Scarlet B, 3B
if necessary brightened with
Rosazeïne B, 13
further
Eosines, all brands, dyed as stated alongside (in the first column).
} dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

The following dyestuffs of the above combinations yield dyeings of very good fastness to light:

Milling Red FR
Diamine Scarlet B, 3B
Diamine Brilliant Scarlet S
Diamine Fast Red F
Scarlet FR, F2R, F3R.

The methods of dyeing are given on pages 188 and 189.

Pink Shades on Woollen Yarn.

Excellently fast to milling and light		Special properties of fastness
Diamine Fast Red F, chromed, if necessary shaded with Anthracene Yellow C, BN	dyed with Glauber's salt and acetate of ammonia, aftertreated with chromium fluoride or bichromate of potash. (method 7.)	**Dyestuffs fast to steaming:** All the dyestuffs with the exception of Brilliant Scarlet R – 4R Scarlet EC Naphtol Red EB Brilliant Croceïne, all brands Milling Red FR Wool Red BG Diamine Scarlet B Anthracene Yellow BN.
For less brilliant reds: Anthracene Chrome Red A if necessary combined with Diamine Fast Red F	dyed with Glauber's salt and sulphuric acid, or acetic acid, aftertreated with bichromate of potash. (method 4a or 4b.)	Fairly fast to stoving and satisfactory for most purposes are: Crystal Scarlet 6R Brilliant Scarlet 6R Roccelline Milling Red G Diamine Red 4B, 6B Anthracene Yellow C Magenta Ia. Diamond Magenta yellow shade.
		Dyestuffs fast to steaming: All the dyestuffs with the exception of Scarlet EC Brilliant Croceïne, all brands Eosine BN Eosine Scarlet B Erythrosine, all brands Rose Bengale extra N, the shades of which are somewhat changed on severe steaming.
Diamine Fast Red F, direct, shaded with Rosazeïne B, 13	dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)	**Dyestuffs fast to carbonising:** All the dyestuffs with the exception of Irisamine G Eosine, all brands Magenta Ia. Diamond Magenta yellow shade. The material must be thoroughly neutralised after carbonising, when dyed with one of the following dyestuffs: Diamine Red 4B, 6B Diamine Purpurine B, 3B, 6B Diamine Brilliant Scarlet S.

The methods of dyeing are given on pages 188 and 189.

Dyestuffs for Claret

Simplest and cheapest method of production

Lanafuchsine SB
Brilliant Orseille C
Naphtol Red C
Amaranth
Azo Red A
Azo Rubine A
} dyed with bisulphate of soda. (method 1a.)

or

Cerise Ia.
Russian Red B, G
} dyed with some acetic acid. (method 8.)

For very bright shades:

Acid Magenta
Lanafuchsine 6B
} dyed with bisulphate of soda. (method 1a.)

or

Magenta Ia. Diamond
Magenta yellow shade
} dyed with some acetic acid. (method 8.)

For shades excellently fast to light, especially on carpet yarn, yarn for upholstery, etc.:

Brilliant Croceïne 5B—9B
Croceïne AZ.

Suitable shading products:

For acid colours:
Acid Yellow AT
Orange II, extra, GG
Cyanole extra
Tetra Cyanole V
Azo Wool Violet 7R.

For basic colours:
Methyl Violet 4R.

The following dyestuffs of the above combinations yield dyeings of very good fastness to light:

Lanafuchsine SB, 6B
Naphtol Red C
Amaranth
Azo Rubine A
Brilliant Croceïne, all brands
Croceïne AZ
} (exceedingly good)
Azo Wool Violet 7R
Acid Yellow AT
Orange, all brands.

Of good fastness to washing and milling

a) Of good fastness to washing and milling next to wool and cotton:

Milling Red G, FR
shaded with
Formyl Violet S4B
Formyl Blue B
Brilliant Milling Blue B
} dyed with Glauber's salt and acetic acid. (method 1b.)

b) Of good fastness to washing and milling next to wool:

Wool Red B, BG
if necessary shaded with
Formyl Violet S4B
Milling Yellow 0
} dyed with Glauber's salt and acetic acid. (method 1b.)

further:

Diamine Bordeaux S, B
Diamine Red 10B
if necessary shaded with
Oxy Diamine Violet B
Diamine Yellow CP
or combinations of
Diamine Fast Red F
Diamine Violet N
} dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

Satisfactory for many purposes are:

Lanafuchsine 6B
Brilliant Croceïne 5B–9B
Croceïne AZ
if necessary shaded with
Acid Violet 6BS
Tropaeoline 0
} dyed with Glauber's salt and bisulphate of soda. (method 1a.)

The following dyestuffs of the above combinations yield dyeings of very good fastness to light:

Milling Red FR
Wool Red B
Lanafuchsine 6B
Brilliant Croceïne, all brands
Croceïne AZ
} (exceedingly good)
Milling Yellow 0
Tropaeoline 0
Diamine Bordeaux B
Diamine Fast Red F
Diamine Violet N
Oxy Diamine Violet B
Diamine Yellow CP.

The methods of dyeing are given on pages 188 and 189.

Shades on Woollen Yarn.

Excellently fast to milling and light	Special properties of fastness
Combinations of: Diamine Fast Red F Anthracene Chrome Violet B Anthracene Chrome Blue R, B, F } dyed with Glauber's salt and acetic acid, aftertreated with chromium fluoride or bichromate of potash. (method 4b.) or Anthracene Chrome Red A if necessary shaded with Anthracene Chrome Violet B } dyed with Glauber's salt and sulphuric acid, aftertreated with bichromate of potash. (method 4a.)	Dyestuffs fast to steaming: All the dyestuffs are excellently fast to steaming, with the exception of Brilliant Croceïne, all brands Croceïne AZ, the shades of which become somewhat yellower and duller on severe steaming. Dyestuffs fast to carbonising: All the dyestuffs with the exception of Cerise Ia. Russian Red B, G Magenta Ia. Diamond Magenta yellow shade Methyl Violet 4R. Fairly fast to carbonising are: Brilliant Orseille C Naphtol Red C Amaranth Lanafuchsine 6B Azo Wool Violet 7R, the shade of which turns somewhat bluer. The material must be thoroughly neutralised after carbonising when dyed with one of the following dyestuffs: Diamine Bordeaux B Diamine Red 10B. Dyestuffs fast to stoving: All the dyestuffs with the exception of Naphtol Red C — Croceïne AZ Amaranth — Milling Red FR Acid Magenta — Wool Red B, BG Brilliant Croceïne, all brands — Diamine Bordeaux B Russian Red B, G. Fairly fast to stoving and satisfactory for most purposes are: Milling Red G — Magenta yellow shade Tropaeoline O — Cerise Ia. Magenta Ia. Diamond — Methyl Violet 4R.

The methods of dyeing are given on pages 188 and 189.

Dyestuffs for Violet

Simplest and cheapest method of production

Acid Violet 6BS
Acid Violet 6BC
Acid Violet 4RS
Azo Wool Violet 7R
Azo Wool Violet 4B
if necessary shaded with
Cyanole extra, FF
Tetra Cyanole extra

} dyed with bisulphate of soda. (method 1a).

or

Methyl Violet 6B—4R
Crystal Violet 5B bluish

} dyed with some acetic acid. (method 8.)

For very light and brilliant lilac shades:

Methyl Violet 6B—3B
Crystal Violet 5B bluish

} dyed in a soap bath and then stoved. (see page 210.)

For shades exceedingly fast to light, especially on carpet yarn, yarn for upholstery, etc.:

Lanacyl Violet B
if necessary shaded with
Cyanole extra, FF

} dyed with Glauber's salt and acetic acid. (method 1c.)

The following dyestuffs of the above combinations yield the best dyeings in point of fastness to light:

Lanacyl Violet B
Azo Wool Violet 7R
Cyanole extra, FF
Tetra Cyanole extra.

Of good fastness to washing and milling

a) Of good fastness to washing and milling next to wool and cotton:

Formyl Violet S4B, S5B, 6B, 8B, 10B
Alkaline Violet CA, C

} dyed with Glauber's salt and acetic acid. (method 1b.)

if necessary shaded with
Brilliant Milling Blue B
Formyl Blue B.

b) Of good fastness to washing and milling next to wool:

Oxy Diamine Violet B, R
Diamine Violet N
if necessary shaded with
Diamine Sky Blue FF
Diamine Blue RW
Diaminogene extra

} dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

Satisfactory for many purposes are:

Methyl Violet 6B—4R
Crystal Violet 5B bluish

} dyed with some acetic acid. (method 8.)

The following dyestuffs of the above combinations yield dyeings of very good fastness to light:

Diamine Violet N
Oxy Diamine Violet B, R
Diaminogene extra.

The methods of dyeing are given on pages 188 and 189.

Shades on Woollen Yarn.

Excellently fast to milling and light		Special properties of fastness
Anthracene Chrome Violet B if necessary shaded with Anthracene Chrome Blue R, B, F for brightening: Formyl Violet S4B Brilliant Milling Blue B Formyl Blue B	dyed with Glauber's salt and sulphuric acid, aftertreated with bichromate of potash. (method 4a.)	**Dyestuffs fast to steaming:** All the dyestuffs are excellently fast to steaming with the exception of Acid Violet 4RS Lanacyl Violet B Diaminogene extra, the shades of which are somewhat changed on severe steaming. **Dyestuffs fast to carbonising:** All the dyestuffs with the exception of Acid Violet 4RS Methyl Violet B—4R. Fairly fast to carbonising is Azo Wool Violet 7R, the shade of which is turned somewhat bluer. **Dyestuffs fast to stoving:** All the dyestuffs with the exception of Acid Violet 4RS Lanacyl Violet B Formyl Violet 8B, 10B Diaminogene extra. Fairly fast to stoving and satisfactory for most purposes are: Formyl Violet 6B Methyl Violet B—4R.

The methods of dyeing are given on pages 188 and 189.

Simplest and cheapest method of production

For bright blues:

Cyanole FF, extra, AB
Tetra Cyanole V, SF, extra
Indigo Blue N, SGN
if necessary shaded with
Acid Violet 6BS
} dyed with bisulphate of soda. (method 1a.)

further:

Alkaline Blue, all brands
if necessary shaded with
Alkaline Violet CA, C
} dyed with soda or borax and then soured off. (method 3.)

For very clear pale blues:

Victoria Blue B { dyed in a soap bath and then stoved. (see page 210.)

For navies and dark blues:

Azo Wool Blue SE
Azo Navy Blue B, 3B
Acid Navy Blue A
if necessary shaded with
Azo Wool Violet 4B
Acid Violet 6BS
Orange II, extra
} dyed with bisulphate of soda. (method 1a.)

or:

Cyanole Green B, 6G
Cyanole Fast Green G
Acid Green extra conc., B
in combination with
Azo Wool Violet 7R, 4B
Acid Violet 6BS
} dyed with bisulphate of soda. (method 1a.)

For shades excellently fast to light, especially on carpet yarn, yarns for upholstery, etc.:

Peri Wool Blue B, BG, G { dyed with bisulphate of soda. (method 1a.)

Lanacyl Blue BB, R
Lanacyl Navy Blue B, BB
Lanacyl Violet B
Naphtol Blue G, R
} dyed with Glauber's salt and acetic acid. (method 1c.)

Of good fastness to washing and milling

a) Of good fastness to washing and milling next to wool and cotton:

For bright blues:

Brilliant Milling Blue B
Formyl Blue B
Formyl Violet S4B
Brilliant Milling Green B
} dyed with Glauber's salt and acetic acid. (method 1b.)

Alkaline Blue, all brands
Alkaline Violet CA, C
} dyed according to method 3.

Water Blue R, B, RB { dyed with bisulphate of soda. (method 1b.)

Dyeings of Alkaline Blue and Water Blue must be soured off after milling.

For navies and dark blues:

Anthracite Black B, R
shaded with
Formyl Violet S4B—10B
Brilliant Milling Blue B
Brilliant Milling Green B
} dyed with Glauber's salt and acetic acid. (method 1b.)

Anthracene Acid Black SBB
shaded as aforestated
} dyed with Glauber's salt and sulphuric acid, aftertreated with bichromate of potash. (method 4a.)

For very cheap navies and dark blues of moderate fastness to light:

Combinations of:

Formyl Violet S4B—10B
Logwood
} dyed with the addition of 4% sulphate of iron 2% sulphate of copper 2—3% oxalic acid or on chromed wool, in order to obtain the best possible fastness to milling.

b) Of good fastness to washing and milling next to wool:

Diamine Sky Blue FF
Diamine Blue RW
} dyed direct or aftertreated with sulphate of copper

Diamine Blue BB, 3B, BX
Diamine Steel Blue L
Diaminogene extra
if necessary brightened with:
Formyl Violet S4B—10B
Brilliant Milling Blue B
} dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

The methods of dyeing are given on pages 188 and 189.

Shades on Woollen Yarn.

Excellently fast to milling and light

Anthracene Chrome Blue F
Anthracene Chrome Blue G
Anthracene Chrome Blue BB
Anthracene Chrome Blue B
Anthracene Chrome Blue R
} dyed with Glauber's salt and sulphuric acid, aftertreated with bichromate of potash, or dyed on chromed wool. (methods 4a and 6.)

Bright blues are shaded with:

Brilliant Milling Green B
Brilliant Milling Blue B
Formyl Blue B
Formyl Violet S4B—10B.

Very deep dark blues are shaded with:

Anthracene Chrome Black F, 5B
(for one-dip dyeings).

Anthracene Acid Black DSF
(for dyeings on chromed wool).

The following withstand best the potting process and cross-dyeing in an acid bath:

Anthracene Chrome Blue F
Anthracene Chrome Blue G
Anthracene Chrome Blue BB
} dyed with Glauber's salt and sulphuric acid, aftertreated with bichromate of potash. (method 4a.)

Special properties of fastness

Dyestuffs fast to steaming:

All the dyestuffs are excellently fast to steaming with the exception of

Peri Wool Blue B, BG
Lanacyl Blue BB, R
Lanacyl Violet B
Anthracite Black B, R
Anthracene Acid Black DSF
Diamine Sky Blue FF
Diamine Blue RW
} aftertreated with sulphate of copper
Diaminogene extra
Victoria Blue B,

the shades of which are somewhat changed on severe steaming.

Dyestuffs fast to carbonising:

All the dyestuffs with the exception of

Azo Wool Violet 7R (fairly good)
Lanacyl Blue BB, R
Peri Wool Blue, all brands
Water Blue, all brands
Alkaline Blue, all brands
Diamine Sky Blue FF
Diamine Blue RW
} aftertreated with sulphate of copper
Victoria Blue B

and the Logwood combination mentioned.

Dyestuffs fast to stoving:

All the dyestuffs with the exception of

Indigo Blue SGN, N
Peri Wool Blue, all brands
Lanacyl Blue BB, R
Lanacyl Navy Blue B, BB
Lanacyl Violet B
Water Blue, all brands
Acid Green, all brands
Formyl Violet 8B, 10B
Diaminogene extra

and the Logwood combination mentioned.

Fairly fast to stoving and satisfactory for most purposes are:

Formyl Violet 6B
Anthracene Acid Black DSF
Diamine Sky Blue FF
Diamine Blue RW
} aftertreated with sulphate of copper.

The methods of dyeing are given on pages 188 and 189.

Dyestuffs for Green and

Simplest and cheapest method of production

Cyanole Green B, 6G
Cyanole Fast Green G
if necessary shaded with
Naphtol Yellow S
Indian Yellow FF
Tropaeoline 00, 0
Orange II, extra, IV, GG
Lanafuchsine SG
Azo Wool Blue SE
(for saddening)
} dyed with bisulphate of soda. (method 1a.)

For shades of excellent fastness to light, especially on carpet yarn, yarns for upholstery, etc.:

Naphtol Green B
(excellently fast to light)
shaded with
Acid Yellow AT
Orange GG
Lanafuchsine SG
Peri Wool Blue G
Cyanole Fast Green G
(for brightening)
} dyed with bisulphate of soda. (method 1a.)

For bright greens:

Acid Green extra conc.
Acid Green extra conc. B
Acid Green 5G
Fast Acid Green BN
Cyanole Fast Green G
if necessary shaded with
Acid Yellow AT
Naphtol Yellow S
Tetra Cyanole V
} dyed with bisulphate of soda. (method 1a.)

further

Solid Green Crystals 0
Malachite Green conc.
Brilliant Green Crystals extra
if necessary shaded with
Thioflavine T
} dyed with some acetic acid. (method 8.)

For very bright, pale yellowish green shades:

(Parrot Green)

Combinations of:

Thioflavine T
Victoria Blue B
} dyed in a soap bath and then stoved (see page 210).

Of good fastness to washing and milling

a) Of good fastness to washing and milling next to wool and cotton:

Combinations of:

Brilliant Milling Green B
Milling Yellow 0, 00
Wool Red B, BG
Formyl Blue B
} dyed with Glauber's salt and acetic acid. (method 1b.)

Still faster to milling are combinations of:

Brilliant Milling Green B
Anthracene Yellow BN
Milling Red G
Formyl Blue B
} dyed with Glauber's salt and acetic acid, aftertreated with bichromate of potash. (method 4b.)

For deep shades:

Combinations of:

Diamine Green G
Diamine Fast Yellow FF
Diamine Catechine G
Diamine Brown M
Diaminogene extra
} dyed with Glauber's salt and acetate of ammonia, aftertreated with chromium fluoride. (method 7.)

b) Of good fastness to washing and milling next to wool:

Combinations of:

Diamine Green G, B
Diamine Dark Green N
Diamine Yellow CP
Diamine Brown 3G
Diamine Scarlet B
} dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

If only a medium fastness to washing and milling is required, combinations of the following will prove satisfactory:

Cyanole Fast Green G
Acid Yellow AT
Tropaeoline 0
Orange GG
Lanafuchsine SG
} dyed with bisulphate of soda. (method 1a.)

The methods of dyeing are given on pages 188 and 189.

Olive Shades on Woollen Yarn.

Excellently fast to milling and light	Special properties of fastness

Combinations of:

Anthracene Chrome Blue G, BB, F
Brilliant Milling Green B (for brightening)
Anthracene Yellow BN
Anthracene Chrome Brown D
Anthracene Chrome Red A

dyed with Glauber's salt and sulphuric acid, aftertreated with bichromate of potash (method 4a), or on chromed wool (method 6).

or of

Anthracene Chrome Blue G, BB, F
Brilliant Milling Green B (for brightening)
Anthracene Yellow C, BN
Anthracene Acid Brown G, N, B

dyed with Glauber's salt and acetic acid, aftertreated with bichromate of potash (method 4b), or on chromed wool (method 6).

For cheap, very dark shades:

Combinations of:

Anthracene Chrome Blue G, BB
Anthracene Chrome Black F, 5B
Anthracene Yellow C, BN
Anthracene Acid Brown G, N, B

dyed with Glauber's salt and acetic acid, aftertreated with bichromate of potash. (method 4b.)

Dyestuffs fast to steaming:

All the dyestuffs are excellently fast to steaming with the exception of

Naphtol Green B
Diamine Green G, B
Diaminogene extra
Diamine Catechine G
Thioflavine T
Victoria Blue B,

the shades of which are somewhat changed on severe steaming.

Dyestuffs fast to carbonising:

All the dyestuffs with the exception of

Peri Wool Blue G
Thioflavine T
Victoria Blue B.

The material must be thoroughly neutralised after carbonising when dyed with one of the following dyestuffs:

Tropaeoline 00
Orange IV.

Dyestuffs fast to stoving:

All the dyestuffs with the exception of

Acid Green, all brands
Fast Acid Green BN
Peri Wool Blue G
Wool Red B, BG
Diaminogene extra
Diamine Scarlet B
Anthracene Yellow BN
Anthracene Acid Brown G
Solid Green Crystals 0
Malachite Green conc.
Brilliant Green Crystals extra.

Fairly fast to stoving and satisfactory for most purposes are the following:

Naphtol Green B
Tropaeoline 00, 0
Orange IV
Milling Red G
Diamine Catechine G
Diamine Brown 3G
Anthracene Yellow C.

The methods of dyeing are given on pages 188 and 189.

Dyestuffs for Blacks

Simplest and cheapest method of production (Direct acid blacks fast to light)

For bluish blacks:

Naphtylamine Black S, 7BS, 6BS, 4BS, SGG, ES3B
Naphtol Black 6B, 3B
Naphtol Blue Black 6B, S3B
— dyed with bisulphate of soda. (method 1a.)

Naphtylamine Black 4B, 6B, dyed with Glauber's salt, acetic acid and bisulphate of soda. (method 1c.)

For deep blacks:

Naphtylamine Black T, TJ, TN, SS2B, SS3B, S00, ESS, ESN
Naphtol Black 2B, B, SG
Naphtol Blue Black S2B, SB
— dyed with bisulphate of soda. (method 1a.)

Naphtylamine Black X2B, X3B, 00, dyed with Glauber's salt, acetic acid and bisulphate of soda. (method 1c.)

The following dyestuffs level exceedingly well:

For blue black:
Azo Merino Black 8B, 6B, 6BE

For jet black:
Azo Merino Black B, BE
— dyed with bisulphate of soda. (method 1a.)

Suitable shading products are:

For very bluish blacks:
Acid Violet 6BS
Brilliant Milling Blue B
Tetra Cyanole V
Cyanole Green B, 6G
Acid Green extra conc.

For jet blacks:
Indian Yellow FF
Tropaeoline 00
Acid Yellow AT
Orange II, extra.

Fast to washing, milling and light

a) Of good fastness to washing and milling next to wool and cotton:

Anthracene Acid Black NS, SW
Anthracene Acid Black LW (for reddish blacks)
— dyed with oxalate of ammonia, acetic acid and bisulphate of soda, aftertreated with bichromate of potash. (method 5.)

Anthracene Acid Black DSF, DSFB
— dyed with acetic acid and sulphuric acid, aftertreated with bichromate of potash. (method 5a.)

The following dyestuffs level exceedingly well:

Anthracene Acid Black SR, SA
Anthracene Acid Black SBB (for blue black)
— dyed with Glauber's salt and sulphuric acid, aftertreated with bichromate of potash. (method 4a.)

Direct, without chroming:

Naphtyl Blue Black FB, FBB
— dyed with Glauber's salt, acetic acid and sulphate of copper. (method 2.)

b) Of good fastness to washing and milling next to wool:

Naphtyl Blue Black N
Naphtylamine Black NBB, RNB, R (for deep blacks)
— dyed with oxalic acid, Glauber's salt and sulphate of copper. (method 2.)

Naphtyl Blue Black, Naphtylamine Black NBB, RNB and R may be dyed on knitting yarns etc. which are not steamed, even without the addition of sulphate of copper; the latter however increases the weight of the wool by about 2% and improves the fastness of the dyeings to washing.

For knitting and hosiery yarns the following are also very largely used:

Naphtylamine Black 4B, 6B
Naphtylamine Black X2B, X3B (for deep blacks)
— dyed with Glauber's salt, acetic acid and bisulphate of soda. (method 1c.)

For very cheap blacks of minor fastness to light:

Combinations of:
Naphtyl Blue Black N
Naphtylamine Black NBB, RNB
with Logwood or Fustic
— dyed with the addition of 4% sulphate of iron 2% sulphate of copper 2—3% oxalic acid.

Suitable shading products are:

Those mentioned in the 3rd column (page 207.)

The methods of dyeing are given on pages 188 and 189.

Excellently fast to milling and light

Anthracene Chrome Black F, Anthracene Chrome Black FE — dyed with oxalate of ammonia, acetic acid and bisulphate of soda, aftertreated with bichromate of potash. (method 5.)

Anthracene Chrome Black 5B, Anthracene Chrome Black P extra, PR extra — dyed with acetic acid and bisulphate of soda, aftertreated with bichromate of potash. (method 5.)

For very deep blacks:

Anthracene Chrome Black FR — dyed like the "F" brand.

The following resist the potting process best:

Anthracene Chrome Black P extra, PR extra, 5B.

For articles which are subsequently cross-dyed, the following come into consideration:

Anthracene Chrome Black P extra, F.

In order to obtain good fastness to acids, the dyeings intended for the respective treatment are chromed a little more than usual, as follows:

For 4% dyestuff with 1½% bichrome.
„ 5% „ „ 2 % „
„ 6% „ „ 2½% „

Suitable shading products are:

For very bluish blacks:

Formyl Violet S4B – 10B
Brilliant Milling Blue B
Formyl Blue B
Brilliant Milling Green B

and for Anthracene Colours the following brands also:

Anthracene Chrome Blue F, BB, B, Anthracene Chrome Violet B — for dyeings specially fast to light.

For jet blacks:

Anthracene Yellow C, BN
Anthracene Acid Brown G.

Special properties of fastness

Dyestuffs fast to steaming:

All the dyestuffs are excellently fast to steaming with the exception of:

Naphtylamine Black 4B, 6B, X2B, X3B, 00
Naphtyl Blue Black, all brands, Naphtylamine Black RNB, NBB, R — when dyed without the addition of sulphate of copper or milled in an alkaline liquor.
Anthracene Acid Black LW, DSF, DSFB
and the Logwood combination mentioned.

Severe steaming changes the dyeings to some extent, but they resist ordinary steaming perfectly well.

Dyestuffs fast to carbonising:

All the dyestuffs with the exception of

Naphtyl Blue Black, all brands, Naphtylamine Black NBB, RNB, R — dyed with the addition of sulphate of copper, or subjected to alkaline milling.
Anthracene Acid Black SW, LW
and the Logwood combination mentioned.

A thorough neutralising after carbonising is necessary for yarns dyed with:

Azo Merino Black, all brands
Tropaeoline 00.

Dyestuffs fast to stoving:

All the dyestuffs with the exception of

Naphtylamine Black 4B, 6B, X2B, X3B, 00, NBB, RNB, R
Naphtyl Blue Black, all brands
Anthracene Acid Black SW, LW
Anthracene Yellow BN
Anthracene Acid Brown G
Acid Green extra conc.
Formyl Violet 8B, 10B
and the Logwood combination mentioned.

Fairly fast to stoving and satisfactory for most purposes are:

Naphtylamine Black ES3B, ESS, ESN
Anthracene Acid Black NS, DSF, DSFB, SA
Anthracene Yellow C
Tropaeoline 00, 0
Formyl Violet 6B.

The methods of dyeing are given on pages 188 and 189.

Chlorination of Wool.

By treating wool with solutions of chloride of lime and dilute acid the fibre is made to assume a high degree of brilliancy and is less liable to shrink or felt during washing or milling. At the same time its affinity for the majority of dyestuffs is considerably increased, and this property may be taken advantage of in producing two-coloured effects on pure woollen piece-goods according to our patented process (British Patent No. 14472/98, see our pamphlet No. 1983).

By a subsequent soaping a very soft feel is imparted to the chlorinated and dyed wool. By soaping and then acidulating it is given a scroop similar to that of silk. Both these methods are frequently adopted for the production of the so-called "silk wool", especially for knitting and hosiery yarns.

The chlorination is carried out as follows:

The yarn (after being scoured if necessary) is wetted out and then

1. treated for 1/4 hour in a cold bath containing 1 1/2 gallons hydrochloric acid 35° Tw. per 100 gallons liquor; the liquor is then run off, or the goods are lightly hydroextracted and then entered without rinsing!
2. into a cold chloride of lime bath*) prepared with 15—20% chloride of lime on the weight of the yarn and which stands at about 0,5 — 0,9° Tw. The goods are frequently turned for about 1/2 hour in this liquor and are then taken
3. again to the first hydrochloric acid bath (1), where they are treated for about 20 minutes. They are subsequently rinsed very well and may then be dyed.

*) Preparation of the chloride of lime solution: Stir dry chloride of lime (containing 35% of chloride) with five times its weight of cold water to an uniform paste; then add again 15 times its weight of water and allow to settle. The clear solution is used.

Should the yellow tone resulting from the chlorination be objectionable (e. g. in the case of white or particularly bright shades) the yarn is finally treated for 15 – 20 minutes in a handwarm bath containing about 1 lb bisulphite of potash per 10 gallons; this will entirely remove the yellow tinge. The goods are finally rinsed.

It will be observed that the dyestuffs are much more readily absorbed by chlorinated than by non-chlorinated wool, and it is therefore advisable to commence dyeing without any acid, whilst later on a little acid may be added in order to exhaust the bath. It is also useful to enter the yarn at rather a lower temperature than usual and to bring the bath only gradually to the boil.

After dyeing, the goods are well rinsed, hydroextracted, and thereupon either soaped and then acidulated, or merely soaped, to produce a scroopy or soft feel as desired.

Producing a scroopy, silk-like feel:

This is obtained by treating the yarn for 10 minutes in a cold soap bath of 8 oz olive-oil soap per 10 gallons, souring off lightly with hydrochloric or sulphuric acid, hydroextracting, and drying.

Producing a very soft handle:

Prepare a concentrated, cold bath of

$^3/_4$—1 lb olive-oil soap
$1^1/_2$—3 oz olive-oil
1 „ ammonia of 0,913 sp. grav.

} per 10 gallons liquor,

turn the dyed and hydroextracted yarn therein for 10 to 15 minutes, hydroextract again, and dry.

Stoved or "Sulphurised" Colours.

In order to produce the so-called sulphurised colours, the yarns are dyed either in a soap bath or in an acid bath, and then exposed to the action of gaseous sulphurous acid (by stoving in a sulphur stove).

By this method the yarns are obtained in a very supple and open condition, and also in particularly pure and brilliant shades such as cannot be achieved in any other manner.

The sulphurised colours are chiefly in demand for Berlin and fancy wools; the favourite shades are: Cream, greenish yellow to gold, orange, maize, salmon, chamois, pink, Imperial red, lilac, azure, blue, and yellowish green (parrot green).

Dyeing pale shades:

Pale shades are always dyed in a soap bath, the following dyestuffs fast to stoving being used:

For cream, light sulphur yellow, maize, salmon and chamois:

Mixtures of

Thioflavine T,
Rosazeïne B or 13, and
Irisamine G.

For pale greenish yellows and yellowish greens:

Mixtures of

Thioflavine T and
Victoria Blue B.

For light pink:

Rosazeïne B or 13
Irisamine G
Rose Bengale extra N (for very bluish shades).

For lilac:

Methyl Violet 3B—6B
Crystal Violet 5B bluish.

For azure:

Victoria Blue B.

For white:

Victoria Blue B (for milk white)
Methyl Violet 3B—6B } for ivory white.
Crystal Violet 5B bluish }

The soap bath is prepared with 3—8 oz curd soap or olive-oil soap per 10 gallons. The quantity of soap depends on the relative hardness of the water; the bath should form a thin froth and must not appear milky. After adding the dyestuff in solution and stirring well, the yarn is entered at 40—45° C. (105—115 deg. F.), and turned for about ½ hour, then lifted, hydroextracted as evenly as possible, but not too severely, stoved for 5 or 6 hours, or overnight, in the sulphur stove, and finally dried in the open air in a shady place.

Care should be taken that the yarn is well aired whilst drying in order to remove the smell of sulphurous acid.

White is frequently stoved a second time for a few hours.

Dyeing full, brilliant shades.

For dyeing shades of this kind, acid colours are used as well as basic and Eosine colours. The method of dyeing is the usual one (without soap) in a bath weakly acidulated with acetic acid, or, in the case of acid colours, with the addition of bisulphate of soda, or of Glauber's salt and sulphuric acid.

The following dyestuffs possessing very good fastness to stoving come into consideration:

For shades ranging from sulphur yellow to orange:

Mixtures of

Thioflavine T
Rosazeïne B
Rosazeïne 13
Irisamine G

} dyed with some acetic acid (method 8, page 189).

or with acid colours:

Naphtol Yellow S
Acid Yellow AT
Rosazeïne B
Rosazeïne 13

} dyed with bisulphate of soda (method 1a, page 188).

For greenish yellow to yellowish green:

Mixtures of

Thioflavine T
New Methylene Blue N, NSS,
Victoria Blue B

} dyed with some acetic acid (method 8, page 189).

or with acid colours:

Naphtol Yellow S
Acid Yellow AT
Tetra Cyanole SF

} dyed with bisulphate of soda (method 1a, page 188).

For medium and dark pinks:

In the first instance:

Rosazeïne B
Rosazeïne 13

} dyed with acetic acid (method 1b, page 188).

For less bright shades, which are however inferior in fastness to light to those produced with Rosazeïne:

Erythrosine, all brands
Phloxine
Rose Bengale extra N

} dyed with acetic acid (method 1b, page 188,) or on an alum, tartar and acetic acid mordant (see page 97.)

For exceedingly brilliant, light reds (Imperial red):

Rosazeïne B or 13 shaded with Orange extra, Brilliant Scarlet GG, G, Scarlet FR	dyed with acetic acid or Glauber's salt and sulphuric acid (method 1b or 1a, page 188).

For blue:

Alkaline Blue 6B—3R	dyed with soda or borax, and soured off (method 3, page 189).
Victoria Blue B; for greenish blues: Cyanole FF, Tetra Cyanole SF, extra	dyed with Glauber's salt and sulphuric acid (method 1a, page 188).

After dyeing, the yarns are rinsed and hydroextracted, then stoved and finished off, as described on page 211.

Note.

In dyeing in a soap bath, it is conditional that the water used be as soft as possible in order to ensure the best results; the use of condensed water is therefore strongly advisable. Hard water must be softened before use.

Special attention must be paid to the dissolving of the dyestuff. The dyestuff solution is best filtered through a piece of cotton cloth and added in measured portions to the dyebath.

When matching off, it should be taken into consideration that the shades only develop by the stoving and as a rule become considerably deeper thereby; on this account a sample of the dyed yarn is before matching frequently suspended for a short while in a large bottle, containing at the bottom a mixture of bisulphite and sulphuric acid.

Our

Anthracene Chrome Black, patented,

bears further the abbreviated name of

"Crown Black"

and is also under this denomination very well known to the trade.

The different brands may be referred to equally well as:

Crown Black F	or	Anthracene Chrome Black F
Crown Black FE	or	Anthracene Chrome Black FE
Crown Black 5B	or	Anthracene Chrome Black 5B
Crown Black P extra	or	Anthracene Chrome Black P extra
Crown Black PR extra	or	Anthracene Chrome Black PR extra
Crown Black PF extra	or	Anthracene Chrome Black PF extra.

The Dyeing of Loose Wool and Woollen or Worsted Yarns and Cops in Dyeing Machines.

The Dyeing of Loose Wool and Woollen or Worsted Yarns and Cops in Dyeing Machines.

Dyeing Machines.

The chief advantage of dyeing loose wool and woollen or worsted yarns in machines is that the goods maintain their original softness and are not in the least felted by the dyeing process. Various kinds of dyeing machines have already proved exceedingly useful and have been successfully introduced at a great many dyeworks.

The dyeing of wool in form of cops is also gaining steadily in importance; for this purpose machines are used into which the cops are evenly packed, but more particularly machines in which the cops are dyed on perforated spindles.

In selecting a machine, an important point to be considered is the material of which the machine is constructed. Iron machines for instance are not to be recommended for wool dyeing, as they are affected considerably by the acid dye liquors, the dyeings also being apt to turn out dull.

Wooden or copper machines with bronze, copper or nickeline fixtures, and spindles for the cops consisting of nickeline, are the best adapted.

Water for Machine-dyeing.

Special care has to be taken that the water used for dyeing be pure and soft.

At a good many dyeworks the condense water accumulating in the steam pipes is quite sufficient to cover the very small requirements of machine-dyeing; if however the available quantity should not be sufficient, it is advisable to soften the water by removing the lime in a suitable manner (see part dealing with water in the appendix to this book).

The softening of the water on a small scale is best done in a special vat provided with a delivery cock fixed 4 to 8 inches

above the bottom. In proportion to the hardness of the water, 5—10 oz oxalate of ammonia per 100 gallons are added; the water is then stirred well, the precipitate allowed to settle, and the clear water free from lime is let off by the cock.

Dissolving the Dyestuff.

In order to prevent spotty dyeings, it is very important to dissolve the dyestuff perfectly before dyeing. Boiling condensed water, or water otherwise as free from lime as possible, is used for dissolving, the solution being added to the dye liquor through a fine sieve or a piece of cotton cloth.

Dyeing of Loose Wool in Dyeing Machines.

For dyeing loose wool in machines, the same dyestuffs are suitable which are used for the machine-dyeing of slubbing; thus, the directions and tables given for the dyeing of slubbing (see pages 162—181) are equally applicable for the dyeing of loose wool.

Anthracene Chrome Black P extra has proved to be the black best adapted for this purpose; it dyes very full blue-black shades, which may be shaded more towards blue by the addition of some Anthracene Chrome Black 5B and yields deep blacks, when mixed with some Anthracene Chrome Black PR extra. All three brands produce dyeings which satisfy the most exacting demands with respect to fastness to milling, steaming, potting, carbonising, and light; they are very easily soluble, dye excellently level, and possess the great advantage of not frothing.

The Dyeing of Woollen and Worsted Yarns in Dyeing Machines.

Yarn is either dyed in the same machines as used for loose wool, or in automatic yarn-dyeing machines. In addition to the economy in labour, steam and water, machine-dyeing

offers the considerable advantage that the yarns do not felt, but remain very soft and open. Machine-dyeing has been found especially well adapted for knitting yarns, Berlin wool and woollen yarns, and for all kinds of yarns which are apt to felt.

When charging the machines, special care should be taken to prevent the formation of channels during the dyeing, which may easily cause uneven results. In the case of machines with a separate reservoir for the liquor it is easy to counteract the formation of channels by interrupting the circulation for a few minutes after about ½ hour's boiling; when the pump is started again, the liquor will circulate differently than at first.

The yarn is as a rule wetted or if necessary washed with ammonia and soap before it is dyed or placed into the machine. Boiling is only necessary for yarns which are very apt to curl. Yarns which contain little or no grease may be wetted in the machine itself or by means of some ammonia.

The same dyestuffs and combinations come into consideration for dyeing as indicated on pages 186—207 for dyeing woollen or worsted yarns in the open vat.

Besides the Anthracene Chrome Colours, the Diamine Colours are especially favoured by reason of their very simple method of dyeing, especially for producing light compound shades, and for yellows, reds and clarets.

For blacks fast to washing on knitting and hosiery yarns,

Naphtylamine Black WA and 4B

are chiefly used; further,

Naphtyl Blue Black N and
Naphtylamine Black RNB, NBB

which are still faster to washing and, if still better fastness to milling is required,

Anthracene Chrome Black F, FE and
Anthracene Acid Black SR

are very generally employed.

The dyeing instructions remain the same as indicated on pages 188 and 189 with the exception that the quantity of acid is reduced by about one-fourth, the dyebath being considerably shorter than usual, and that the liquor is brought to the boil more gradually.

For subsequent shading it is of advantage to cool the dyebath well and to bring it gradually again to the boil after adding the dyestuff. If Anthracene Colours are used for subsequent shading, it is advisable to add 5 % acetate of ammonia together with the dyestuff to the cooled bath. The additions are best made gradually and from a trickling vessel placed above the dyeing machine.

After dyeing, it is best either to rinse in the machine itself, or, if the dye liquor is to be used over again, in an ordinary vat or in a rinsing machine.

Dyeing of Woollen and Worsted Yarns in the Form of Cops.

The same dyestuffs and methods of dyeing which are given in the tables on pages 166—181 for the dyeing of slubbing come into consideration for the dyeing of cops both by the packing and by the spindle system.

If the cops are dyed in machines by the packing system, particular attention has to be paid to their being packed evenly and that the interstices are well filled, for which purpose loose cotton is usually employed.

The use of soft water free from lime is of great importance and especially so for cop dyeing. It is not advisable to correct the water in the machine itself, as the precipitated lime would adhere to the cops, and the yarn would then dust during weaving etc.

Acid Colours and Chrome Colours are chiefly used for dyeing.

Of the former, especially Acid Yellow AT, Orange GG, Lanafuchsine SG and SB, Cyanole extra, Cyanole Green B and 6G and Cyanole Fast Green G render excellent service in the dyeing of mode shades, whilst Milling Yellow 0, Milling Red G, Wool Red B, Rosazeïne B and 13, Formyl Violet, Formyl Blue B, Brilliant Milling Blue B and Brilliant Milling Green B are preferred for dyeing bright shades fast to milling (on effect yarns).

The Anthracene Chrome Colours answer the most exacting requirements with respect to fastness. Particularly Anthracene Yellow BN, Anthracene Chrome Red A, Anthracene Chrome Brown D and Anthracene Chrome Blue G, F, BB, B and R are very well adapted for the purpose. The afterchroming on cops is usually done in the dyebath itself.

For Blacks on fancy yarns, Naphtylamine Black S is usually employed, and for dyeings fast to washing Naphtyl Blue Black N, whilst Anthracene Chrome Black F and FE serve for articles fast to milling.

Piece-Dyeing.

Our

Anthracene Chrome Black, patented,

bears further the abbreviated name of

"Crown Black"

and is also under this denomination very well known to the trade.

The different brands may be referred to equally well as:

Crown Black F	or Anthracene Chrome Black F
Crown Black FE	or Anthracene Chrome Black FE
Crown Black 5B	or Anthracene Chrome Black 5B
Crown Black P extra	or Anthracene Chrome Black P extra
Crown Black PR extra	or Anthracene Chrome Black PR extra
Crown Black PF extra	or Anthracene Chrome Black PF extra.

Piece-Dyeing.

Piece-Dyeing.

Wetting out before Dyeing.

Before dyeing, the goods should be very carefully wetted out in hot water. Goods which are not quite clean are wetted out by adding 1—2% ammonia (calculated on the weight of the material) to the water and removing this again by rinsing thoroughly*). Uniform results in dyeing are aided by a prolonged boiling in water previous to dyeing, especially with goods that are apt to yield uneven results or give different shades on account of their being manufactured from various qualities of wool in the same piece.

Carbonised goods.

Carbonised goods as a rule are neutralised before dyeing, with soda or ammonia, and then again thoroughly rinsed. When dyeing with easily levelling colours, it is sufficient to partially remove the acid by rinsing the goods in water.

Shoddy Goods.

Pieces containing dark-coloured shoddy material are best used for dyeing dark shades or blacks. For the production of bright, pale shades, it is frequently necessary to strip the original colour previous to dyeing, as described on pages 136—138.

Dye Vats.

The dyeing is generally done in a dye vat fitted with a winch driven by mechanical power, the pieces being almost invariably worked in rope form. If the lists tend to roll up, they are stitched together, and in this way the defect known as "listing" is prevented.

Dyestuffs for Piece-dyeing.

The colours used for dyeing belong to the following groups:

1. Acid Colours;
2. Chrome Colours (Anthracene Chrome and Anthracene Acid Colours);
3. Diamine Colours;
4. Eosine and some Basic Colours.

*) In order to produce good uniform dyeings, it is specially important that the woollen pieces are free from stains and particularly also that they contain no residues of soap. Further, all other faults, such as are caused by the use of different qualities of yarn, or by careless milling, carbonising or steaming, must be absent.

On account of their simple method of application and excellent levelling properties, the Acid Colours take the first place for dyeing woollen piece-goods. They are of the greatest importance for dyeing ladies' dress goods of all kinds, plushes, curtain goods, facings and billiard cloths, and are also most extensively employed for gentlemen's suitings. For producing dyeings fast to washing on flannels, such Acid Colours as Formyl Violet, Brilliant Milling Blue, Alkaline Blue, Brilliant Milling Green, Milling Yellow, Milling Red, Wool Red, and Rosazeïne B and 13 are chiefly used, these colours being distinguished by their excellent fastness to washing.

With regard to fastness to rubbing, steaming, alkalies, perspiration and hot pressing, the Acid Colours in general satisfy normal demands. In the case of very high requirements with respect to fastness to light, alkalies and perspiration, or if the goods are to be subjected to milling after dyeing, our Anthracene Chrome and Anthracene Acid Colours are employed. They are especially important for the better classes of gentlemen's dress goods, and uniform and livery cloths.

The Diamine Colours are extensively used for producing colours fast to washing on flannel and hosiery goods.

The Eosine and Basic Colours serve for bright, cheap pink and red shades on flannel and low-class blanket materials.

Methods of Dyeing Acid Colours.

Method 1a.

A. For Levelling Colours (page 6).

Naphtol Yellow, Fast Yellow, Acid Yellow AT, Acid Yellow Crystals, Indian Yellow, Metanil Yellow, Tropaeoline, Orange GG, extra, II, IV, R, Azo Orseille, Lanafuchsine, Acid Magenta, Brilliant Orseille, Acid Violet, Azo Wool Violet, Azo Wool Blue, Azo Navy Blue, Acid Navy Blue, Indigo Blue, Thiocarmine, Cyanole, Tetra Cyanole, Cyanole Green, Cyanole Fast Green, Acid Green, Fast Acid Green and Azo Merino Black.

Charge the bath with

10 % Glauber's salt crystals,

5—10 % bisulphate of soda (according to the depth of shade) and the requisite dyestuff;

or with

20 % Glauber's salt crystals,

2—4 % sulphuric acid and the dyestuff.

Enter hot, or in the case of light goods at boiling temperature, and boil for 1—1½ hour. When dyeing deep shades or black, some bisulphate of soda or sulphuric acid may be added in order to thoroughly exhaust the bath. With goods containing effect threads of vegetable fibres a thorough exhaustion of the dye liquor is of special importance.

Goods which are not easily penetrated, such as heavily milled cloths, meltons, etc., are entered at a lower temperature, and the bath is then brought gradually to the boil. The quantity of Glauber's salt may also be slightly increased with advantage.

In the case of carbonised goods, which have not been neutralised, the dyeing is commenced with Glauber's salt only, and if necessary some bisulphate of soda or acid is added subsequently.

The dyestuffs named above may without hesitation be used for shading in the boiling bath, and only in the case of very pale compound shades is it advisable to exercise more care in their selection. The following easily levelling products are particularly well suited for this purpose:

Fast Yellow S	Azo Orseille BB
Acid Yellow AT	Tetra Cyanole V
Orange GG	Cyanole Green B.

It is advantageous to use the old bath over again, as experience has shown that the Acid Colours level still better in the standing bath than in a fresh one.

The requisite additions to the standing bath are about one-quarter of the original quantities of Glauber's salt and about one-half of the bisulphate of soda or acid used for the first bath.

B. For Acid Colours in general.

(These brands are chiefly used as self colours and less frequently in mixtures.)

Orange EN, ENZ, Scarlet, Brilliant Scarlet, Crystal Scarlet, Brilliant Cochineal, Brilliant Croceïne, Croceïne AZ, Naphtol Red, Roccelline, Amaranth, Azo Red, Azo Rubine, Naphtol Green, Peri Wool Blue, Naphtylamine Blacks of the S series, Naphtol Blue Black and Naphtol Black.

The method of dyeing is the same as that given for the levelling colours mentioned under "A"; it is well however to increase the quantity of Glauber's salt to 20—30% and to commence dyeing at a lower temperature (about 45° C. or 115 deg. F.).

When entering the goods hot, the bath should first be charged with only about half the quantity of bisulphate of soda, the rest being added in several portions after about half an hour's boiling.

In the case of Peri Wool Blue it is advisable to enter as first described at a temperature not exceeding 45° C. (115 deg. F.) and to add the whole quantity of acid together with 30% Glauber's salt at the commencement of the dyeing.

For subsequent shading, the levelling colours enumerated under "A" are used, which may be added direct to the boiling liquor. If, however, shading is to be done with the same Acid Colours as were used at the commencement, the bath should first be cooled off and, after adding the dyestuffs, again be brought gradually to the boil.

Method 1b.

For Milling Yellow, Milling Red, Wool Red, Rosazeïne, Eosine, Formyl Violet, Alkaline Violet, Formyl Blue, Brilliant Milling Blue and Brilliant Milling Green.

Charge the bath with

10% Glauber's salt crystals,
2— 4% acetic acid and the dyestuff.

Enter at about 50° C. (120 deg. F.), raise within half an hour to the boil, and exhaust the bath after half to three quarters of an hour's boiling by the gradual addition of 3—5% acetic acid, or for Wool Red, Formyl Violet and Brilliant Milling Green of 3—5% bisulphate of soda or 1—2% sulphuric acid.

Rosazeïne, Formyl Violet and Brilliant Milling Green (especially deep shades of the last two) may also be dyed according

to method 1a mentioned under "B" for Acid Colours (page 228), and Eosine according to instructions on page 97.

As long as only slight additions are required for subsequent shading, levelling colours as mentioned under "A", which do not necessitate cooling off the bath, are employed.

Method 1c.

For Lanacyl Colours, Azo Merino Blue, Naphtol Blue, and for Naphtol Black and Naphtylamine Black 7BS in combination with Formyl Violet for the production of navies and dark blues.

Charge the bath with

20 % Glauber's salt crystals,
10 % acetic acid and the dyestuff.

Enter lukewarm, raise within ¾ to 1 hour to boiling point, and boil until the bath is exhausted (about 1 hour).

When using Lanacyl Navy Blue or combinations of same with Lanacyl Blue, or Azo Merino Blue, Naphtol Blue, Naphtol Black and Naphtylamine Black 7BS,

4—6 % bisulphate of soda

(according to the depth of shade) are added, and the dyeing is continued at the boil for another 20 minutes in order to completely fix the colour.

For goods containing kempy wools, the bath should be boiled very hard; the covering of kempy fibres is also assisted by the addition of some acid.

For shading, those levelling colours which can be added direct to the boiling bath are used, viz.:

Cyanole extra	Cyanole Fast Green G
Azo Wool Blue SE	Azo Orseille BB
Acid Violet 6BS	Orange GG.

Method 1d.

For the dyestuffs of the Naphtylamine Black 4B series.

Charge the bath with

10 % Glauber's salt crystals,
5 % acetic acid and the dyestuff.

Enter at about 70° C. (160 deg. F.), and raise in 20 minutes to the boil; after ¾ hour's boiling add

5–7 % bisulphate of soda or
2–2½% sulphuric acid

in two portions, and boil for another 20–30 minutes until the bath is completely exhausted. Dyeing may also be started direct with bisulphate of soda or sulphuric acid, but in this case the black is not quite so bloomy as when dyed according to the above instructions.

Commence dyeing with the addition of

10 % Glauber's salt crystals and
5 % bisulphate of soda or
2 % sulphuric acid,

and after ¾ hour's boiling add about the same quantities of bisulphate of soda or sulphuric acid in order to exhaust the bath.

When dyeing goods which are difficult to penetrate, it is advisable to enter at a lower temperature and to increase the quantity of Glauber's salt to 20–25 %.

The following dyestuffs serve for shading:

For blue blacks	Acid Violet 6BS	For jet blacks	Indian Yellow FF
	Tetra Cyanole V		Tropaeoline 00, 0
	Cyanole Green B, 6G		Acid Yellow AT
	Acid Green extra conc.		Orange II, extra.

If Naphtylamine Black has to be added for shading, the bath must first be cooled off a little and then be heated again gradually.

Method 2.

For Naphtyl Blue Black N and Naphtylamine Black R.

Charge the bath with

1—2 % oxalic acid (according to the hardness of the water),
5 % acetic acid (for blue 2—3 % acetic acid),
20 % Glauber's salt crystals and the dyestuff.

Enter at about 70° C. (160 deg. F.), raise in 20 to 35 minutes to the boil according to the quality of the goods, and after about 1 hour's boiling exhaust the bath, if necessary by

the addition of some more acetic acid. Then add

3 % sulphate of copper

and allow to run for another 1/2 hour without steam.

The shade becomes slightly darker by the addition of sulphate of copper.

When dyeing goods difficult to penetrate, the bath should be cooler at the commencement and be raised slowly to the boil.

Several lots may be dyed consecutively in the same liquor, for which purpose the bath is cooled off slightly and

1/4—1/2 % oxalic acid,

3 % acetic acid (for blue 1—2 % acetic acid),

7 % Glauber's salt crystals and the dyestuff

are added; after boiling for about 1 hour the bath is exhausted if necessary with some acetic acid; finally

2 1/2 % sulphate of copper

are added and the goods allowed to run for another 1/2 hour without steam.

The following dyestuffs serve for shading:

For blue blacks	Lanacyl Blue BB, R	for jet blacks	Brilliant Milling Green B
	Cyanole extra		Anthracene Yellow C
	Brilliant Milling Blue B		Acid Yellow AT.

Regarding the combination of Naphtyl Blue Black with Logwood and Sumac extract we refer to page 258.

Method 3.

For Alkaline Blue and Alkaline Violet.

Charge the bath with

1—2 % soda ash or

3—6 % borax and the dyestuff,

enter at about 60° C. (140 deg. F.), raise in 20 minutes to 90° C. (195 deg. F.) and according to the depth of shade allow the goods to run for 1/2—3/4 hour at this temperature.

Then rinse very thoroughly and develop for 1/4 hour in a fresh bath at 60—70° C. (140—160 deg. F.) containing

4—5 % sulphuric acid.

Finally rinse again thoroughly.

The use of vessels made of copper should be avoided as far as possible, as the shades are not quite so bright when dyed in copper.

When dyeing deep shades, the baths are only partially exhausted, and for this reason they are advantageously used for dyeing subsequent lots.

Carbonised goods must be neutralised very thoroughly before dyeing.

Methods of Dyeing Chrome Colours.

Method 4a.

For Anthracene Chrome Brown, Anthracene Chrome Red, Anthracene Chrome Violet, Anthracene Chrome Blue, Anthracene Acid Brown G, Anthracene Yellow BN, Anthracene Acid Black SR, SRT, SBB, Naphtylamine Black Cr and CrN.

Charge the bath with

15 % Glauber's salt crystals,
1—4 % sulphuric acid (according to the depth of the shade) and the dyestuff.

Enter at 40—50° C. (105—120 deg. F.), raise to the boil in about ½ hour, and boil for 1 hour; then cool off somewhat, add the requisite quantity of bichromate of potash, heat again gradually, and boil for another ¾ hour.

When dyeing blacks, the goods may be entered at a somewhat higher temperature and the bath raised more quickly to the boil.

For the dyeing of colours other than blacks, the quantity of bichromate of potash necessary may be reckoned as being about ⅔ of the quantity of dyestuff used, while for Anthracene Acid Black SR ½—⅓, and for Anthracene Acid Black SRT, SBB and Naphtylamine Black Cr and CrN ⅓ of the quantity of bichromate of potash as of dyestuff is sufficient.

Generally speaking, the same quantity of sulphuric acid as of dyestuff is used, but not less than 1 % nor more than 4 %; for Anthracene Chrome Brown D however not more than 3 % sulphuric acid should be used, whilst deep blacks require up to 5 %.

When dyeing Anthracene Chrome Violet B, Anthracene Chrome Blue (all brands), Anthracene Acid Black SR, SRT, SBB, Naphtylamine Black Cr and CrN in copper vessels, heat the dyebath first to 40 – 50° C. (105 – 120 deg. F.), then charge it with ¼ – ½ % sulphocyanide of ammonia (of the weight of the wool), stir well, and allow to stand for 20 minutes before adding Glauber's salt, acid and dyestuff.

For shading (provided the desired shade has approximately been obtained), levelling colours are best used, which may be added direct to the boiling liquor; for this purpose the following are most suitable:

Acid Yellow AT	Tetra Cyanole V
Orange GG	Cyanole Green B, 6G
Azo Orseille BB	Cyanole Fast Green G.

If larger percentages of dyestuff are necessary for shading, the bath must first be cooled off to about 45° C. (115 deg. F.), the goods then being brought carefully to shade with Chrome Colours; when using more than 1 % of the latter, it is well to chrome again with half the quantity of bichromate of potash as of dyestuff.

Method 4b.

For Anthracene Yellow GG, C, R, and Anthracene Acid Brown R, N, B, V and SW.

With the exception of the Anthracene Acid Blacks and the Naphtylamine Blacks, all the dyestuffs enumerated under 4a may also be dyed according to this method.

Charge the bath with

10 % Glauber's salt crystals,
5 % acetate of ammonia*) and the dyestuff,

enter at about 50° C. (120 deg. F.), raise in about ½ hour to

*) Details for preparing acetate of ammonia are given in the foot note on page 114.

the boil, and after 1/2 hours boiling exhaust the bath by the gradual addition of

3—6 % acetic acid or
2—5 % bisulphate of soda.

Then cool off the bath a little, add the requisite quantity of bichromate of potash (about half the quantity as of dyestuff), raise again to the boil, and allow to run at the boil for another 1/2—3/4 hour.

Anthracene Yellow GG is advantageously aftertreated with chromium fluoride, the same weight as of dyestuff, but not more than 3 1/2 % being required.

The levelling colours enumerated sub method 4a are the most suitable for shading.

Method 5.

For Anthracene Chrome Black and Anthracene Acid Black ST, DSF and DSFB.

According to the hardness of the water, charge the bath first with

5—10 oz oxalate of ammonia*) per 100 gallons liquor,
stir well and add
10 % Glauber's salt crystals,
3— 4 % acetic acid and the dyestuff.

Enter at about 70° C. (160 deg. F.), raise to the boil in about 20 minutes, exhaust the bath after 1/2 hour's boiling (3/4 hour in the case of Anthracene Acid Black DSF and DSFB) by the gradual addition of

5—10 % bisulphate of soda or
2— 4 % sulphuric acid,

and when the liquor is of a slightly reddish colour, chrome for 1/2—3/4 hour at the simmer with

1 1/2— 3 % bichromate of potash.

1	%	bichromate of potash	is	used	for	4	%	dyestuff
1 1/2	%	„	„	„	„	5	%	„
2	%	„	„	„	„	6	%	„
2 1/2	%	„	„	„	„	7	%	„
3	%	„	„	„	„	8	%	„

*) Details for preparing oxalate of ammonia are given in the foot note on page 112.

For Anthracene Acid Black DSF and DSFB not more than 2—2½ % bichromate of potash are used.

Anthracene Chrome Black 5B and P extra, and Anthracene Acid Black ST may be dyed without the addition of oxalate of ammonia.

The same dyestuffs which are recommended in method 4a serve here for shading; if the shading has to be done with blacks, Anthracene Acid Black DSF and ST are advantageously resorted to; before adding these, however, the liquor should be cooled off to some extent.

The hot water used in carrying out the potting process may to advantage be acidified with acetic or formic acid before entering the goods. On no account must the goods be left in an alkaline condition, which might result from the milling or from the neutralising after carbonising; if this be the case the alkalinity is corrected by acidifying the last rinsing bath before drying.

Method 6.

For Anthracene Colours on a chrome mordant.

Mordant the goods as usual, for 1½ hour at the boil, with

2—4 % bichromate of potash
1½—3 % tartar
} according to the depth of shade;

rinse in water, and dye in a fresh bath with the addition of

1—3 % acetic acid or
5 % acetate of ammonia*) (for very pale shades).

Enter the dyebath at 40—50° C. (105—120 deg. F.), raise in ½ hour to the boil, and continue boiling for 1—2 hours. In order to exhaust the bath after 1 hour's boiling, gradually add

3—6 % acetic acid,

according to requirement.

For subsequent shading, the levelling colours enumerated under 4a are of first importance; the remarks in the same paragraph relating to the dyeing in copper vessels also hold good in this case.

Carbonised goods must be neutralised before mordanting, as the bichrome-sulphuric acid mordant yields less satisfactory results.

*) Details for preparing acetate of ammonia are given in the foot note on page 114.

Methods of Dyeing Diamine Colours.

Method 7.

Charge the bath with

10—20 % Glauber's salt crystals (according to the depth of shade),

or,

10—20 % Glauber's salt crystals,
5 % acetate of ammonia*) and the dyestuff.

Enter at 60° C. (140 deg. F.), raise the temperature of the bath in 20—30 minutes to the boil; then sample, and if necessary shade in the boiling bath with the same dyestuffs as used before.

If necessary the baths may be completely exhausted by the gradual addition of

2—5 % acetic acid;

acetic acid, however, is as a rule only used with such colours as are to be aftertreated with metallic salts, e. g. Diamine Fast Red F.

The aftertreatment is carried out by adding to the exhausted dyebath

1/2—2 % bichromate of potash (about half the quantity as of dyestuff used),

or,

1—3 1/2 % chromium fluoride (same weight as of dyestuff),

and working for about another hour at the simmer.

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*) Details for the preparation of acetate of ammonia are given in the foot note of page 114.

Method of Dyeing Basic Colours.

Method 8.

Charge the bath with

2—3 % acetic acid and the dyestuff;

enter at 50° C. (120 deg. F.), raise in about ½ hour to 80° C. (175 deg. F.), and dye for another 15—20 minutes at this temperature.

Colours which have been dyed too deep a shade can easily be stripped somewhat by adding some acetic acid to the dyebath and then heating if necessary almost to boiling point.

Dyestuffs for Grey and Mode

Cheapest method of production	Of better fastness to light
Combinations of: *Naphtol Yellow S Indian Yellow FF Orange II, extra *Azo Orseille BB *Lanafuchsine SB (for deep shades) Indigo Blue N } dyed with bisulphate of soda. (method 1a.)	Combinations of: *Acid Yellow AT *Orange GG Orange II, extra *Azo Orseille BB *Lanafuchsine SB (for deep shades) *Cyanole Green B, 6G *Tetra Cyanole V } dyed with bisulphate of soda. (method 1a.) Shades still better in fastness to light and alkalies are obtained with combinations of: *Acid Yellow AT *Orange GG *Lanafuchsine SG *Cyanole Fast Green G } dyed with bisulphate of soda. (method 1a.) Combinations of the last named dyestuffs are also very well adapted for dyeing gentlemen's suitings containing effect threads.

The dyestuffs marked with an asterisk (*) do not stain

For the dyeing of woollen goods with white silk

For ladies' materials:

Acid Yellow AT
Orange GG
Lanafuchsine SG
Azo Wool Blue C
} dyed with Glauber's salt and acetic acid or formic acid. (see page 265.)

The fastness to light, steaming, carbonising, and stoving of the above
The methods of dyeing are

Shades on Woollen Piece-Goods.

Of very good fastness to washing	Excellently fast to light and washing
Combinations of: *Milling Yellow O *Milling Red G Wool Red B *Brilliant Milling Green B — dyed with Glauber's salt and acetic acid. (method 1b.) or Diamine Yellow CP Diamine Brown M Diamine Catechine G Diamine Scarlet B, 3B Diamine Rose BD Diaminogene extra — dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)	Combinations of: *Anthracene Yellow BN Anthracene Acid Brown G Anthracene Chrome Brown D *Anthracene Chrome Red A *Anthracene Chrome Blue F Anthracene Chrome Blue BB, G *Anthracene Chrome Violet B — dyed with sulphuric acid, after-treated with bichromate of potash (method 4a), or, on chromed wool. (method 6). The following are suitable for shading in the boiling bath: *Acid Yellow AT *Orange GG *Azo Orseille BB *Tetra Cyanole V *Cyanole Green B, 6G *Cyanole Fast Green G.

effect threads of cotton, China-grass or artificial silk.

effect threads the following dyestuffs may be used:

For gentlemen's suitings:

Anthracene Yellow BN
Anthracene Chrome Violet B
Anthracene Chrome Blue F — dyed on chromed wool (for details see pages 265 and 269).

mentioned dyestuffs will be found in the tables of the general part. given on pages 226—237.

Dyestuffs for Brown Shades

Cheapest method of production

Combinations of:

*Naphtol Yellow S
Indian Yellow FF
Orange II, extra
*Naphtol Red C
*Indigo Blue N

} dyed with bisulphate of soda. (method 1a.)

If easily levelling properties are of importance, Naphtol Red C may be substituted by Lanafuchsine SG.

For prune shades.

Combinations of:

Orange II, extra
*Azo Wool Violet 7R
*Indigo Blue N

} dyed with bisulphate of soda. (method 1a.)

Of better fastness to light

Combinations of:

*Acid Yellow AT
Tropaeoline 00, 0
Orange II, extra, IV
*Lanafuchsine SG
*Cyanole Green 6G

} dyed with bisulphate of soda. (method 1a.)

Still faster to light, alkalies and perspiration are combinations of:

*Acid Yellow AT
*Orange GG
*Lanafuchsine SG
*Cyanole Fast Green G

} dyed with bisulphate of soda. (method 1a.)

Combinations of the last named products are also very well adapted for dyeing gentlemen's suitings containing cotton effect threads.

For prune shades.

Combinations of:

*Orange GG
*Azo Wool Violet 7R
*Tetra Cyanole V

} dyed with bisulphate of soda. (method 1a.)

The dyestuffs marked with an asterisk (*) do not stain

For the dyeing of woollen materials containing white silk

For ladies' materials:

Acid Yellow AT
Naphtol Yellow S
Orange GG
Lanafuchsine SG
Azo Wool Blue C

} dyed with Glauber's salt and acetic acid or formic acid (see page 265).

The fastness to light, steaming, carbonising, and stoving of the above
The methods of dyeing are

Shades on Woollen Piece-goods.

Of very good fastness to washing	Excellently fast to light and washing
Combinations of: *Milling Yellow 0, 00 *Milling Red G *Brilliant Milling Green B *Formyl Violet S4B (for prune shades) dyed with Glauber's salt and acetic acid. (method 1b.) further: Diamine Brown R, M Oxy Diamine Brown G Diamine Catechine G Diamine Yellow CP Diamine Scarlet B, 3B Diaminogene extra Oxy Diamine Violet B (for prune shades) dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)	A. Combinations of: Anthracene Chrome Brown D, A Anthracene Acid Brown G *Anthracene Yellow BN *Anthracene Chrome Red A *Anthracene Chrome Blue R, F *Anthracene Chrome Blue BB, G *Anthracene Chrome Violet B dyed with sulphuric acid, after-treated with bichromate of potash (method 4a), or on chromed wool (method 6). B. Combinations of: Anthracene Acid Brown G, N, B, V *Anthracene Yellow BN *Anthracene Chrome Red A *Anthracene Chrome Blue R, F Anthracene Chrome Blue BB, G *Anthracene Chrome Violet B dyed with acetic acid, aftertreated with bichromate of potash (method 4b), or on chromed wool (method 6). Best suited for shading in a boiling bath are: *Acid Yellow AT *Orange GG *Azo Orseille BB *Tetra Cyanole V *Cyanole Green B, 6G *Cyanole Fast Green G.

effect threads of cotton, China-grass or artificial silk.

effect threads the following dyestuffs may be used:

For gentlemen's suitings:

Anthracene Yellow BN
Anthracene Chrome Violet B
Anthracene Chrome Blue F
} dyed on chromed wool (see pages 265 and 269).

mentioned dyestuffs will be found in the tables of the general part, given on pages 226—237.

Dyestuffs for Yellow and Orange

Cheapest method of production	Of better fastness to light

Yellow.

For bright yellows:

*Naphtol Yellow S — dyed with bisulphate of soda. (method 1a.)

For deep yellows:

Indian Yellow, Indian Yellow G — dyed with bisulphate of soda. (method 1a.)

For bright yellows:

*Acid Yellow AT, *Fast Yellow S — dyed with bisulphate of soda. (method 1a.)

For deep yellows:

Indian Yellow FF, R; Metanil Yellow; Tropaeoline 0, 00, G; Acid Yellow crystals; Orange IV — dyed with bisulphate of soda. (method 1a.)

Orange.

Orange II, extra, Orange R — dyed with bisulphate of soda. (method 1a.)

*Orange GG, Orange EN, ENZ — dyed with bisulphate of soda. (method 1a.)

Orange GG is excellently fast to light and levels exceedingly well.

For very bright oranges.

Combinations of:

*Naphtol Yellow S, *Rosazeïne B, 13 — dyed with bisulphate of soda. (method 1a.)

For very bright oranges.

Combinations of:

*Acid Yellow AT, *Fast Yellow S, *Rosazeïne B, 13 — dyed with bisulphate of soda. (method 1a.)

The dyestuffs marked with an asterisk (*) leave effects threads

(Rosazeïne is satisfactory in this

The following come into consideration for

Naphtol Yellow S, Acid Yellow AT, Orange GG, Lanafuchsine SG — dyed with Glauber's salt and acetic acid or formic acid (see page 265.)

The fastness to light, steaming, carbonising, and stoving of the above

The methods of dyeing are

Shades on Woollen Piece-goods.

Of very good fastness to washing	Excellently fast to light and washing

Yellow.

*Milling Yellow 0
*Milling Yellow 00
} dyed with Glauber's salt and acetic acid. (method 1b.)

or

Thioflavine S
Diamine Fast Yellow FF
Diamine Yellow CP
Diamine Gold
} dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

*Milling Yellow 0, 00
dyed with Glauber's salt and acetic acid. (method 1b.)

*Anthracene Yellow BN
Anthracene Yellow C
Anthracene Yellow R
} dyed with acetic acid, aftertreated with bichromate of potash (method 4b), or, on chromed wool. (method 6.)

For greenish yellows:

Anthracene Yellow GG,
dyed with acetic acid, aftertreated with chromium fluoride (method 4b), or, on chromed wool. (method 6.)

Milling Yellow 0, 00 amongst others are used frequently for dyeing yellow cloth employed for uniform facings and bunting (flags).

Orange.

Combinations of:

*Milling Yellow 0, 00
*Milling Red G
} dyed with Glauber's salt and acetic acid. (method 1b.)

For very bright oranges:

*Milling Yellow 0, 00
*Rosazeïne B, 13
} dyed with Glauber's salt and acetic acid. (method 1b.)

Of still better fastness to washing:

Oxy Diamine Orange G, R
Diamine Orange B
or combinations of:
Diamine Yellow CP
Diamine Scarlet B
Diamine Purpurine B
*Rosazeïne B, 13 (for brightening).
} dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

Combinations of:

*Anthracene Yellow BN
Anthracene Yellow C
Anthracene Yellow R
Diamine Fast Red F
} dyed with acetic acid, aftertreated with bichromate of potash (method 4b), or, on chromed wool. (method 6.)

Further:

*Milling Yellow 0, 00
Diamine Scarlet B
} dyed with Glauber's salt and acetate of ammonia. (method 7.)

The combination of Milling Yellow and Diamine Scarlet is largely used for the dyeing of orange cloth for facings for military and other uniforms.

of cotton, China-grass or artificial silk undyed.

respect for pale shades only.)

woollen materials with white silk effects:

Anthracene Yellow BN { dyed on chromed wool. (see pages 265 and 270.)

mentioned dyestuffs will be found in the tables of the general part. given on pages 220—237.

Cheapest method of production	Of better fastness to light

Red.

For bright reds:

*Brilliant Scarlet, all brands
*Crystal Scarlet 6R
*Scarlet FR, F2R, F3R
*Brilliant Cochineal 2R, 4R
*Lanafuchsine SG, SB

} dyed with Glauber's salt and sulphuric acid. (method 1a.)

Brilliant Croceïne R, B, M
Brilliant Croceïne 2B, 3B, 5B
*Brilliant Croceïne 6B, 7B, 9B
Croceïne AZ
*Azo Rubine A

} dyed with bisulphate of soda. (method 1a.)

For specially brilliant light reds:

Combinations of:

*Rosazeïne B, 13
Orange extra
*Naphtol Yellow S

} dyed with Glauber's salt and sulphuric acid. (method 1a.)

For deep reds:

Scarlet EC
*Naphtol Red EB
Roccelline

} dyed with bisulphate of soda. (method 1a.)

Lanafuchsine SG and SB level especially well. Brilliant Cochineal and Scarlet, as self colours as well as in combination with Cochineal, are used amongst others for the dyeing of scarlet cloth for uniform facings. (Method of dyeing see page 263.)

Pink.

Magenta Ia. Diamond
Magenta yellow shade

} dyed with some acetic acid. (method 8.)

*Rosazeïne B, 13

} dyed with acetic acid. (method 1b.)

*Lanafuchsine SG
*Lanafuchsine SB

} dyed with bisulphate of soda. (method 1a.)

For bright pinks:

*Eosine 3G, GGF, L, BN
*Eosine Scarlet B
*Erythrosine yellow shade, D, B, extra N
*Phloxine 749, S
*Rose Bengale extra N

} dyed with acetic acid (method 1b), or, on acetic acid-alum-tartar chrome mordant, in order to obtain greatest brightness (see page 97).

The dyestuffs marked with an asterisk (*) leave effect threads (Rosazeïne is satisfactory

The following come into consideration for the dyeing of

Brilliant Scarlet 4R, 6R
Scarlet FR, F2R, F3R
Brilliant Cochineal 2R
Lanafuchsine SG, SB

} dyed with Glauber's salt and acetic acid or formic acid (see page 265).

The fastness to light, steaming, carbonising, and stoving of the above
The methods of dyeing are

Shades on Woollen Piece-goods.

Of very good fastness to washing	Excellently fast to light and washing

Red.

*Milling Red G, FR
if necessary shaded with
*Rosazeïne B, 13
} dyed with Glauber's salt and acetic acid. (method 1b.)

Further:

Diamine Red 4B, 6B
Diamine Purpurine B, 3B, 6B
Diamine Scarlet B, 3B
} dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

The following are also used frequently for dyeing flannels fast to washing:

Scarlet FR, F2R, F3R
Scarlet EC
Crystal Scarlet 6R
} dyed with Glauber's salt and sulphuric acid. (method 1a.)

Diamine Fast Red F, direct
if necessary shaded with
*Milling Yellow 0, 00
Diamine Fast Yellow FF
} dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

Somewhat faster to washing and alkalies are:

Diamine Fast Red F, chromed
if necessary shaded with
*Anthracene Yellow BN
} dyed with Glauber's salt and acetate of ammonia, after-treated with chromium fluoride. (method 7.)

For less bright reds:

*Anthracene Chrome Red A
if necessary shaded with
Diamine Fast Red F
} dyed with sulphuric acid or acetic acid, aftertreated with bichromate of potash. (method 4a and 4b.)

Diamine Fast Red F is very largely used for the dyeing of cloth for facings and bunting, and for plush for railway carriages.

Pink.

*Rosazeïne B. 13, dyed with acetic acid. (method 1b.)

*Eosine, all brands
*Eosine Scarlet B
*Erythrosine, all brands
*Phloxine 749, S
*Rose Bengale extra N
} dyed with acetic acid (method 1b), or on a mordant of acetic acid-alum-tartar (see page 97).

Somewhat faster to washing are:

Diamine Rose BD, GD
Diamine Scarlet B, 3B
if necessary shaded with
*Rosazeïne B, 13
} dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

of cotton, China-grass or artificial silk unstained.

in pale shades only.)

woollen goods containing white silk effect threads:

Eosine 3G, BN
Eosine Scarlet B
Naphtol Yellow S
Acid Yellow AT
} dyed with Glauber's salt and acetic acid or formic acid (see page 265).

mentioned dyestuffs will be found in the tables of the general part, given on pages 226—237.

Dyestuffs for Claret and Purple

Cheapest method of production	Of better fastness to light

Claret.

*Naphtol Red C
*Amaranth
*Azo Red A
*Brilliant Orseille C
*Lanafuchsine SB
*Azo Orseille BB
— dyed with bisulphate of soda. (method 1a.)

*Azo Rubine A
Brilliant Croceïne 5B
*Brilliant Croceïne 6B
*Brilliant Croceïne 7B
*Brilliant Croceïne 9B
Croceïne AZ
— dyed with bisulphate of soda. (method 1a.)

For very bright shades:

*Acid Magenta, dyed with bisulphate of soda. (method 1a.)
Magenta Ia. Diamond
Magenta yellow shade (chiefly for cheap blanket cloth)
— dyed with bisulphate of soda. (method 8.)

Of the above dyestuffs, Lanafuchsine, Azo Orseille and Acid Magenta are distinguished by their exceedingly good levelling property.

For bright shades:

*Lanafuchsine 6B, dyed with bisulphate of soda. (method 1a.)

Suitable shading products:

*Cyanole extra
*Tetra Cyanole V
*Azo Wool Violet 7R
*Orange GG
Orange II, extra
*Acid Yellow AT.

Purple.

*Acid Violet 6BS
Acid Violet 6BC
*Acid Violet 4RS
— dyed with bisulphate of soda. (method 1a.)

*Azo Wool Violet 7R
*Azo Wool Violet 4B
— dyed with bisulphate of soda. (method 1a.)

Of excellent fastness to alkalies:

*Formyl Violet S4B, S5B, 6B, 8B, 10B, dyed with Glauber's salt and acetic acid or bisulphate of soda. (method 1b or 1a.)

Purple shades exceedingly fast to light:

*Lanacyl Violet B, dyed with Glauber's salt and acetic acid. (method 1c.)

Suitable shading products:

*Cyanole extra, FF
*Tetra Cyanole extra.

The dyestuffs marked with an asterisk (*) leave effect threads

The following come into consideration for the dyeing of

Naphtol Red C
Amaranth
Lanafuchsine SB, 6B
Acid Magenta (in pale shades)
Azo Wool Violet 7R
Acid Yellow AT.
Azo Wool Blue C

dyed with Glauber's salt and acetic or formic acid (see page 265).

The fastness to light, steaming, carbonising, and stoving of the above
The methods of dyeing are

Shades on Woollen Piece-goods.

Of very good fastness to washing	Excellently fast to light and washing

Claret.

Wool Red B, BG
*Milling Red FR
if necessary shaded with
*Formyl Violet S4B
*Milling Yellow 0
dyed with Glauber's salt and acetic acid. (method 1b.)

Further:

Diamine Bordeaux S, B
Diamine Red 10B
if necessary shaded with
Oxy Diamine Violet B
Diamine Yellow CP
dyed with Glauber's salt, or Glauber's salt and acetate of ammonia. (method 7.)

Combinations of:

Diamine Fast Red F
*Anthracene Chrome Violet B
*Anthracene Chrome Blue R, B, F
*Anthracene Yellow BN
dyed with acetic acid, aftertreated with chromium fluoride or bichromate of potash (method 4b), or on chromed goods (method 6).

For dull clarets:

*Anthracene Chrome Red A
if necessary shaded with
*Anthracene Chrome Violet B
dyed with sulphuric acid, aftertreated with bichrom. of potash (method 4a), or on chromed goods (method 6).

The following products are best suited for shading in the boiling bath:

*Lanafuchsine SG, SB
*Azo Orseille BB
*Orange GG
*Cyanole extra
*Acid Violet 6BS.

Purple.

*Formyl Violet, all brands
Alkaline Violet CA, C
if necessary shaded with
*Brilliant Milling Blue B
*Formyl Blue B
dyed with Glauber's salt and acetic acid (method 1b), or, with the exception of Alkaline Violet, also with bisulphate of soda (method 1a).

*Anthracene Chrome Violet B
if necessary shaded with
*Anthracene Chrome Blue R, B, F
For brightening:
Formyl Violet S4B
Brilliant Milling Blue B
Formyl Blue B
dyed with sulphuric acid, aftertreated with bichromate of potash (method 4a), or on chromed goods (method 6).

The following are best suited for shading in the boiling bath:

*Acid Violet 6BS
*Cyanole extra
*Azo Orseille BB.

of cotton, China-grass or artificial silk unstained.

woollen goods containing white silk effect threads:

Anthracene Chrome Violet B
Anthracene Chrome Blue F
dyed on chromed goods (see pages 265 and 270).

mentioned dyestuffs will be found in the tables of the general part, given on pages 226—237.

Dyestuffs for Blue Shades

Cheapest method of production

For bright blues:

*Cyanole FF, extra, AB
*Tetra Cyanole V, SF, extra
*Indigo Blue N, SGN
if necessary shaded with
*Acid Violet 6BS

→ dyed with bisulphate of soda. (method 1a.)

For navy and dark blues:

*Azo Wool Blue SE
*Azo Navy Blue B, 3B
*Acid Navy Blue A
if necessary shaded with
*Azo Wool Violet 4B
*Acid Violet 6BS
*Orange GG
Orange II, extra
*Azo Merino Black 8B, 6B
(for saddening blackish blues)

→ dyed with bisulphate of soda. (method 1a.)

or:

*Cyanole Green B, 6G
*Cyanole Fast Green G
in combination with
*Azo Wool Violet 7R, 4B
*Acid Violet 6BS
*Azo Merino Black 8B, 6B
(for saddening blackish blues)

→ dyed with bisulphate of soda. (method 1a.)

For specially cheap navy and dark blues:

Formyl Violet S4B—10B
Water Blue R, B, RB
Wool Blue TB
Solid Blue R, 3R
Lanacyl Blue R
Lanacyl Navy Blue B, BB
Lanacyl Violet B
in combination with logwood

→ dyed with the addition of 4% sulphate of iron 2% sulphate of copper 2—3% oxalic acid, or on chromed goods (see page 261).

Of better fastness to light

For bright blues:

Alkaline Blue, all brands
if necessary shaded with
Alkaline Violet CA, C

→ dyed with soda or borax, and soured off. (method 3.)

For navy and dark blues:

*Lanacyl Navy Blue BB, B
*Azo Merino Blue 3B, G
*Azo Merino Dark Blue R
Naphtol Blue G, R

→ dyed with Glauber's salt, acetic acid and bisulphate of soda. (method 1c.)

Of excellent fastness to light:

*Peri Wool Blue B, BG, G → dyed according to method 1a.
*Lanacyl Blue BB, R → dyed according to method 1c.
*Lanacyl Violet B → dyed according to method 1c.

For dark blues very fast to alkalies and perspiration on cloth for military riding trousers, liveries, etc.:

Naphtyl Blue Black N
shaded with
*Lanacyl Violet B
*Lanacyl Blue BB, R
*Tetra Cyanole V

→ dyed with oxalic acid, Glauber's salt, acetic acid and sulphate of copper. (method 2.)

For very cheap navy and dark blues, so-called "Brilliant Blues":

*Naphtol Black 3B, 6B
*Naphtylamine Black 7BS
shaded with
*Formyl Violet S4B—10B

→ dyed according to method 1c.

All the dyestuffs enumerated answer normal requirements in steaming; the following withstand very severe steaming:

*Lanacyl Navy Blue B, BB
*Azo Merino Blue 3B, G
*Azo Merino Dark Blue R
Naphtol Blue G, R
*Peri Wool Blue G
*Naphtol Black 3B, 6B
*Naphtylamine Black 7BS
*Tetra Cyanole V
*Formyl Violet S4B—10B.

The dyestuffs marked with an asterisk (*) leave effect threads

The following come into consideration for the dyeing of

For ladies' dress goods:

Azo Wool Blue C, Azo Wool Violet 7R, Lanafuchsine 6B, Orange GG → dyed with Glauber's salt and acetic acid or formic acid (see page 265).

The fastness to light, steaming, carbonising, and stoving of the above

The methods of dyeing are

on Woollen Piece-goods.

Of very good fastness to washing	Excellently fast to light and washing

For bright blues:

Alkaline Blue, all brands
if necessary shaded with
Alkaline Violet CA, C
} dyed with soda or borax, and soured off. (method 3.)

or

*Brilliant Milling Blue B
*Formyl Blue B
*Thiocarmine R
if necessary shaded with
*Formyl Violet S4B
*Brilliant Milling Green B
} dyed with Glauber's salt and acetic acid. (method 1b.)

The Alkaline Blue dyeings must be soured off after the alkaline washing.

For navy and dark blues.

Combinations of:

*Brilliant Milling Green B
*Brilliant Milling Blue B
Wool Red B
*Orange GG
*Formyl Violet S4B (for brightening)
} dyed with Glauber's salt, acetic acid and bisulphate of soda. (method 1b.)

or, with still better fastness to washing, combinations of:

*Anthracene Acid Black SBB
*Formyl Violet S4B—10B
*Brilliant Milling Blue B
*Formyl Blue B
} dyed with Glauber's salt and sulphuric acid, aftertreated with bichromate of potash. (method 4a.)

For most purposes combinations of the following prove satisfactory:

*Cyanole Fast Green G
*Lanafuchsine 6B
*Orange GG
*Formyl Violet S4B (for brightening)
} dyed with bisulphate of soda. (method 1a.)

*Anthracene Chrome Blue F
Anthracene Chrome Blue G
Anthracene Chrome Blue BB
*Anthracene Chrome Blue B
*Anthracene Chrome Blue R
} dyed on a chrome mordant (method 6), or with sulphuric acid, aftertreated with bichromate of potash (method 4a).

Bright blues are shaded with

*Brilliant Milling Blue B
*Formyl Blue B
*Formyl Violet S4B—10B
*Brilliant Milling Green B.

Very deep dark blues are shaded with

Anthracene Acid Black DSF (for dyeings on a chrome mordant)
Anthracene Acid Black SBB, SR (for one-dip dyeings).

Goods which are subjected to the potting process are dyed principally with:

*Anthracene Chrome Blue F
Anthracene Chrome Blue G
Anthracene Chrome Blue BB
} dyed as above staded.

The following are best suited for shading in the boiling bath:

*Cyanole extra
*Azo Wool Blue SE
*Acid Violet 6BS
*Cyanole Fast Green G
*Azo Orseille BB
*Orange GG.

of cotton, China-grass or artificial silk unstained.

woollen goods containing white silk effect threads:

For gentlemen's suitings:

Dark Blue WS
Lanacyl Blue BB, R
Lanacyl Violet B
} for shading } dyed with acetate of ammonia and acetic acid (see page 265 and 269).

Anthracene Chrome Blue F
Anthracene Chrome Violet B
} dyed on chromed goods (for details see pages 265, 269 and 271).

mentioned dyestuffs will be found in the tables of the general part. given on pages 226—237.

Cheapest method of production

*Acid Green extra conc.
*Fast Acid Green B, BN
*Indigo Blue N
in combination with
*Naphtol Yellow S
Indian Yellow FF
Tropaeoline 00, 0
Orange IV, II, extra, R
*Lanafuchsine SG
*Azo Wool Blue SE
(for saddening)

} dyed with bisulphate of soda. (method 1a.)

For bright greens:

*Acid Green extra conc.
*Acid Green extra conc. B
*Acid Green 5G
*Fast Acid Green BN
*Fast Acid Green B
if necessary shaded with
*Naphtol Yellow S
*Tetra Cyanole V

} dyed with bisulphate of soda. (method 1a.)

Of better fastness to light

Combinations of:

*Cyanole Green B, 6G
Indian Yellow FF
*Acid Yellow AT
Orange IV, II, extra, R
*Lanafuchsine SG
*Azo Wool Blue SE
(for saddening)

} dyed with bisulphate of soda. (method 1a.)

Somewhat faster to light, alkalies and perspiration are combinations of the following:

*Cyanole Fast Green G
*Acid Yellow AT
*Orange GG
*Lanafuchsine SG
*Peri Wool Blue G
(for saddening)

} dyed with bisulphate of soda. (method 1a.)

Combinations of the last named products are likewise to be recommended for dyeing gentlemen's suitings containing cotton effect threads.

For shades prominently fast to light:

Naphtol Green B
shaded with
*Acid Yellow AT
Orange GG*, EN
Lanafuchsine SG
*Peri Wool Blue G
*Cyanole Fast Green G
(for brightening)

} dyed with bisulphate of soda. (method 1a.)

Dark green shades are often dyed with the same colours on an Indigo bottom.

For bright greens fast to alkalies (Billiard Green):

*Cyanole Fast Green G
if necessary shaded with
*Acid Yellow AT

} dyed with bisulphate of soda. (method 1a.)

The dyestuffs marked with an asterisk (*) leave effect threads

The following come into consideration for the dyeing of

For ladies' dress goods:

Acid Yellow AT	Acid Green extra conc.	in pale shades.
Naphtol Yellow S	Acid Green 5G	
Orange GG	Naphtol Green B	
Lanafuchsine SG	Azo Wool Blue C	

dyed with Glauber's salt and acetic acid or formic acid (see page 265).

The fastness to light, steaming, carbonising, and stoving of the above

The methods of dyeing are

Shades on Woollen Piece-goods.

Of very good fastness to washing

Combinations of:

*Brilliant Milling Green B
*Milling Yellow 0, 00
*Milling Red G
Wool Red BG
*Formyl Blue B

dyed with Glauber's salt and acetic acid. (method 1b.)

For bright greens:

*Cyanole Fast Green G
*Brilliant Milling Green B
if necessary shaded with
*Milling Yellow 0, 00

dyed with Glauber's salt and acetic acid. (method 1b.)

The following prove satisfactory for many purposes:

Cyanole Fast Green G
if necessary shaded with
Tropaeoline 0
*Acid Yellow AT

dyed with bisulphate of soda. (method 1a.)

Brilliant Milling Green and Cyanole Fast Green amongst others are used frequently for the dyeing of green cloths for uniform facings, etc., and are treated with tannin in order to produce best fastness to water (page 274).

Excellently fast to light and washing

Combinations of:

*Anthracene Chrome Blue F
Anthracene Chrome Blue G, BB
*Cyanole Fast Green G (for brightening)
*Anthracene Yellow BN
Anthracene Chrome Brown D
*Anthracene Chrome Red A

dyed with sulphuric acid and after-treated with bichromate of potash (method 4a), or, on a chrome mordant (method 6.)

or such of:

*Anthracene Chrome Blue F
Anthracene Chrome Blue G, BB
*Cyanole Fast Green G (for brightening)
*Anthracene Yellow BN
Anthracene Acid Brown G, N, B

dyed with acetic acid and aftertreated with bichromate of potash (method 4a), or, on a chrome mordant (method 6.)

Green for Military, Police, Customs and other Uniforms.

Combinations of:

*Anthracene Yellow BN
Anthracene Chrome Blue G
*Cyanole Fast Green G (for brightening)
*Brilliant Milling Green B (for brightening)

dyed on a chrome mordant (method 6), dark shades also with sulphuric acid, aftertreated with bichromate of potash (method 4a.)

dyed on an Indigo bottom.

The following products are best suited for shading in the boiling bath:

*Cyanole Fast Green G
*Cyanole extra
*Acid Yellow AT
*Orange GG
*Azo Orseille BB.

of cotton, China-grass or artificial silk unstained.

woollen goods containing white silk effect threads:

For gentlemen's suiting:

Anthracene Chrome Blue F
Anthracene Yellow BN
Anthracene Chrome Violet B

dyed on a chrome mordant (for details see pages 265 and 270).

mentioned dyestuffs will be found in the tables of the general part, given on pages 226—237.

Direct Blacks of very good fastness to light and normal fastness to alkalies and perspiration

A. For plain goods

For blacks with a bluish cast:

Naphtylamine Black 4B, 6B — dyed according to method 1d.

Naphtylamine Black S, ES3B, 7BS, 6BS, 4BS, SGG
Naphtol Black 6B, 3B
Naphtol Blue Black 6B, S3B
— dyed according to method 1a.

For dense, deep blacks:

Naphtylamine Black X2B, X3B, 00 — dyed according to method 1d.

Naphtylamine Black ESN, ESS, T, TJ, TN, SS2B, SS3B, S00
Naphtol Black 2B, B, SG
Naphtol Blue Black S2B, SB
— dyed according to method 1a.

The following level exceptionally well:

For blue black: Azo Merino Black 8B, 6B, 6BE
For jet black: Azo Merino Black B, BE
— dyed according to method 1a.

Azo Merino Black is extensively used especially for dyeing cashmeres and other light materials.

For specially cheap blacks, so-called Combination-blacks:

Naphtyl Blue Black N, BL
Naphtylamine Black 19J, 4B, 6B, 7BS, X2B, X3B
with Logwood, Fustic
— dyed with oxalic acid and Glauber's salt, aftertreated with sulphate of iron and sulphate of copper (see page 258).

Suitable shading products:

The same as are stated in column 2 of this page.

Further also for jet black:

Indian Yellow FF
Tropaeoline 00, 0
Orange II, extra.

B. For goods containing effect threads

For blacks with a bluish cast:

Naphtylamine Black EFF (effect threads are not stained at all)
Naphtylamine Black S, ES3B, 7BS, 4BS, SGG
Naphtol Black 6B, 3B
Naphtol Blue Black 6B, S3B
— dyed with Glauber's salt and bisulphate of soda or sulphuric acid. (method 1a.) (The baths must be completely exhausted.)

For deep blacks:

Naphtylamine Black ESN, ESS, T, TJ, TN, SS2B, SS3B, S00
Naphtol Black 2B, B, SG
Naphtol Blue Black S2B, SB
— dyed as stated above.

For ladies' dress goods containing effect threads the following are chiefly applied:

for blue black: Azo Merino Black 8B, 6B, 6BE
for jet black: Azo Merino Black B, BE
— dyed as stated above.

Suitable shading products:

for blue black:

Acid Violet 6BS
Tetra Cyanole V
Cyanole Green B, 6G
Acid Green extra conc.

for jet black:

Acid Yellow AT
Orange GG.

The following come into consideration for the dyeing of

For ladies' dress goods:

Naphtylamine Black EFF if necessary shaded with
Azo Wool Violet 7R
Orange GG
Acid Yellow AT
— dyed with Glauber's salt and formic acid, the silk then stripped with hydrosulphite (for details see page 265).

The fastness to light, steaming, carbonising, and stoving of the above

The methods of dyeing are

on Wollen Piece-goods.

Blacks of very good fastness to light, alkalies and perspiration

A. For plain goods

Anthracene Chrome Black F, FE, P extra
Anthracene Chrome Black 5B for blue black
} dyed according to method 5.

Anthracene Acid Black SR, SBB } dyed according to method 4a.

Anthracene Acid Black DSF, DSN, DSFB } dyed according to method 5.

Naphtyl Blue Black N
Naphtylamine Black R (for deep blacks)
} dyed according to method 2.

As a substitute Logwood-iron black on fine qualities of gentlemen's dress suitings, etc.:

Naphtyl Blue Black N in combination with sumac extract } dyed according to directions on page 260.

Dyeings of the Anthracene Chrome Blacks, and in particular those of the 5B and P extra brand, withstand the potting process very well.

Naphtyl Blue Black N and Naphtylamine Black R also prove satisfactory for many purposes, if some acetic acid be added to the potting liquor.

Anthracene Chrome Black and Naphtyl Blue Black are also extensively employed for the piece-dyeing of cloth which is intended for military and other uniforms, facings, etc.

Suitable shading products:

For blue black:
Formyl Violet S4B—10B
Brilliant Milling Blue B
Formyl Blue B
Brilliant Milling Green B

and for the Anthracene Colours:

for blue black: Anthracene Chrome Blue F, BB, B

for jet black: Anthracene Yellow BN, Anthracene Acid Brown G

further:

Anthracene Yellow C
for Naphtyl Blue Black and Naphtylamine Black R.

B. For goods containing effect threads

Naphtylamine Black CrN
Naphtylamine Black Cr
} dyed with bisulphate of soda, aftertreated with bichromate of potash. (method 4a.)

Of still better fastness to alkalies and perspiration:

Anthracene Acid Black SRT
Anthracene Acid Black SR
} dyed as above stated. (method 4a.)

If the requirements are very exacting:

Anthracene Acid Black ST,
dyed with acetic acid and bisulphate of soda, aftertreated with bichromate of potash. (method 5.)

Anthracene Acid Black ST is also used extensively for the dyeing of union linings (Italians, serges, etc.) containing a fast black warp and white or coloured effect threads.

Suitable shading products:

For blue black:
Formyl Violet S4B—10B
Brilliant Milling Blue B
Formyl Blue B
Brilliant Milling Green B
Anthracene Chrome Blue F
(for dyeings especially fast to light).

For jet black:
Anthracene Yellow BN.

woollen goods containing white silk effect threads:

For gentlemen's suitings:

Anthracene Acid Black ST if necessary shaded with Lanacyl Violet B } dyed with Glauber's salt and formic acid, and then chromed with bichromate of potash, as per details on pages 265 and 272.

mentioned dyestuffs will be found in the tables of the general part. given on pages 226—237.

Correcting of defectively dyed Pieces.

Goods dyed with Acid Colours.

The stripping of Acid Colours.

Goods which have been dyed too deep a shade are boiled for 30 – 40 minutes in a fresh liquor charged with 10 – 20 % Glauber's salt crystals, or, if this should not yield satisfactory results, with 5 – 10 % acetate of ammonia, and if necessary with 1 % ammonia, rinsed, and dyed to shade in a fresh acid bath.

Goods which have been dyed too deep a shade with levelling colours are frequently also stripped by boiling for some time together with a white piece, and the latter thus absorbs some of the colour which is boiled off the dyed piece.

Pieces with an uneven or mottled appearance, or pieces which are not sufficiently dyed through, are often corrected by adding larger quantities of Glauber's salt to the old dyebath, and boiling hard for $^1/_2 - ^3/_4$ hour. Should this not produce satisfactory results, the goods are best stripped by boiling for $^1/_2$ hour in a fresh bath charged with

10 % acetate of ammonia*) and
1 % ammonia

and then causing the pieces to absorb the stripped colour again by adding some acid.

Stripping with Hyraldite A.

If the methods described above do not have the desired effect, more energetic stripping agents must be resorted to; as such our Hyraldite A yields excellent results, offering over similar reducing agents the advantage of not tendering the fibre of the material.

*) For the preparation of acetate of ammonia see page 114.

The stripping with Hyraldite A*) is best carried out in a clean wooden vat, the steam pipe of which is wrapped round with some cotton cloth.

Charge the "short" lukewarm bath for pale shades with

2 — 5 % Hyraldite A
1½— 3 % acetic acid

and for dark shades with

6 —10 % Hyraldite A
4 — 6 % acetic acid

} calculated on the weight of the goods,

enter the goods to be stripped at once, heat in about ½ hour to the boil, and continue boiling for 10—20 minutes, according to requirement. Just before lifting the material, add another 3—5 % acetic acid, then rinse first in cold and then in hot water, and re-dye.

Pieces dyed with Chrome and Diamine Colours.

Stripping of Chrome and Diamine Colours.

Hyraldite A is the most suitable stripping agent for Chrome and Diamine Colours, acetate of ammonia or ammonia seldom producing satisfactory results.

The method of stripping with Hyraldite A is the same as stated above.

*) Hyraldite must always be stored in well closed receptacles kept in a cool, dry place. It must be dissolved in warm water before being added to the stripping bath.

The Dyeing of Vegetable Impurities.

(Burls, burrs, threads, straw, etc.)

Covering of Burls, Burrs, etc.

If only a few burls or burrs are noticeable after dyeing, they are removed by means of the burling iron in the usual manner; in dark coloured goods the burls are stained with burling ink.

For goods containing large quantities of burls, such a proceeding is however impracticable; such goods must then either be carbonised or, better still, burl-dyed with Diamine Colours.

Most of our dyestuffs withstand subsequent carbonising very well, as indicated in the tables of the general part.

If, after dyeing, the goods are neutralised with soda or ammonia, the last rinsing bath is acidulated to advantage with some acetic or formic acid.

Burl-dyeing with Diamine Colours.

Burl-dyeing with Diamine Colours is exceedingly simple and is done in the washing machine direct after rinsing the dyed goods.

The following dyestuffs come into consideration for this purpose:

For dark shades and blacks:

Diamine Black RMW, if necessary in combination with the more bluish Diamine Black BH.

For blues:

Diamine Sky Blue — Diamine Black BH.
Diamine Blue 2B, 3B

For green and olive shades:

Combinations of

Diamine Sky Blue — Diamine Black BH
Diamine Blue 3B
with Diamine Fast Yellow A — Diamine Orange G and D.

For violet:

Diamine Heliotrope B	Oxy Diamine Violet B.

For pink, red and claret:

Diamine Rose BD and BG	Diamine Purpurine 6B
Direct Rose T	Diamine Red 10B.
Diamine Nitrazol Brown B	

For brown and mode shades:

Combinations of

Diamine Nitrazol Brown G	Diamine Fast Yellow A
Diamine Brown S	Diamine Orange G and D.
Diamine Sky Blue	

For grey:

Diamine Black BH	Diamine Fast Blue FFB

if necessary shaded with

Diamine Fast Yellow A	Diamine Orange G and D.

For yellow and orange:

Diamine Fast Yellow A	Diamine Orange G and D.

Method of Dyeing.

The pieces dyed in an acid bath are thoroughly rinsed; then a cold bath, as short as possible, is prepared in the washing machine, charged according to the depth of shade with

¾ oz	soda ash	per 10 gallons liquor.
1— 2 lbs	desiccated Glauber's salt	
¼— 3 oz	Diamine Colour	

The goods are worked in this bath for 20—40 minutes and rinsed again. The last rinsing bath is best slightly heated and acidulated with acetic or formic acid.

Naphtyl Blue Black and Naphtylamine Black in Combination with Logwood and Sumac.

Combination-Black.

Logwood combination (so-called Combination-Black).

The combination of Naphtyl Blue Black or Naphtylamine Black with Logwood is extensively used, especially for dyeing piece-goods, yielding very fine bluish blacks at a low cost which offer over the Logwood Blacks the advantage of a very superior fastness to light and acids.

For deep blacks, Fustic extract is used for saddening, as the case may demand.

The following products are best suited for Combination-Black:

Naphtyl Blue Black N Naphtyl Blue Black BL Naphtylamine Black 19J Naphtylamine Black 4B Naphtylamine Black 6B	for bluish blacks, and, saddened with Fustic, also for jet blacks.
Naphtylamine Black 7BS,	for bright bluish blacks.
Naphtylamine Black X2B Naphtylamine Black X3B	for particularly cheap blacks.

Naphtyl Blue Black N and Naphtylamine Black 7BS yield the best dyeings in point of fastness to light.

Method of Dyeing.

Charge the dyebath with

2— 3% oxalic acid (according to the hardness of the water)
10—20% Glauber's salt crystals,

add the requisite quantity of Naphtyl Blue Black or Naphtylamine Black, and Logwood extract or Hematine crystals, or if necessary also some Fustic extract, and boil up the bath. Shut off steam, enter

the wetted out goods, work for 20—30 minutes without steam, and then for about 1 hour at the boil. If by this time the liquor has not assumed a yellowish brown colour (an indication that the Naphtyl Blue Black or the Naphtylamine Black has not all been absorbed), boiling is best continued for another 15—20 minutes with the addition of ½—1% oxalic acid.

Then add

4% sulphate of iron and
4% sulphate of copper

and boil for another ¾ hour.

After dyeing, rinse very thoroughly, or, if necessary, wash with fuller's earth and some acetic acid.

In some dyeworks the metallic salts are added to the bath before starting the dyeing instead of subsequently. The dyes so obtained are not quite so fast to light as those produced by the method described above.

The method of working is as follows:

Charge the dyebath first with

4—6% sulphate of iron
2—3% sulphate of copper
Logwood extract or Hematine crystals and if necessary Fustic extract also,

then add oxalic acid (on an average 2% of the weight of the goods) until the black precipitate in the bath is dissolved and the liquor has assumed a yellowish colour.

Then add the necessary quantity of Naphtyl Blue Black or Naphtylamine Black in solution.

Enter at 60—70° C. (140—160 deg. F.), raise in 20 minutes to boiling point, and allow to boil for about 1¼ hour, when ½—1% oxalic acid is added in order to better exhaust the bath. The bath should finally have only a slightly blackish colour.

After dyeing, rinse thoroughly, or wash, if necessary, with fuller's earth and the addition of some acetic acid.

Naphtyl Blue Black N in Combination with Sumac.

Naphtyl Blue Black in Combination with Sumac.

The combination of Naphtyl Blue Black with Sumac extract is extensively used as a substitute for the iron-logwood black, especially for better-class worsteds for gentlemen's wear (dress suitings etc.).

This method imparts to the goods the full feel and high lustre peculiar to goods dyed with Logwood and iron, and besides increases the weight by about 6 – 8 %. Over the iron black it offers the great advantage of a simpler and quicker method of dyeing, considerably better fastness to light and acids, leaving cotton lists or effect threads much cleaner, and covering vegetable impurities of the wool, such as burrs, particles of jute, wood and straw exceedingly well.

In order to obtain good fastness to rubbing, it is sufficient to rinse the dyed pieces in cold water, whereas iron-logwood black has to be washed for several hours with fuller's earth.

Charge the dyebath with

3 — 4 % oxalic acid (according to the hardness of the water)
20 % Glauber's salt crystals
5 — 6½ % Naphtyl Blue Black N
0,2 — 0,3 % Brilliant Milling Green B
7 % Sumac extract of 52° Tw.

Boil up the bath, shut off steam, enter the wetted out goods, and run for ½ hour without steam and for about 1 hour at the boil. Should the bath by this time not be fully exhausted, another ½ — 1 % oxalic acid must be added.

After exhaustion of the bath add

2 % sulphate of copper and
4 % sulphate of iron,

boil for another 30 minutes and rinse in cold water for ½ — ¾ hour.

The dyebath may be used for dyeing subsequent lots. In such case first add oxalic acid to the bath, and Glauber's salt only when the precipitate is completely dissolved; finally add the dyestuff and 3½ — 4 % sumac extract, proceeding otherwise in the same manner as for the first lot.

Acid Colours in Combination with Logwood for the Production of Navies and Dark Blues.

Navy and Dark Blue with Acid Colours and Logwood.

The combination of Acid Colours with Logwood yields very cheap navy and dark blues, though not of very good fastness to light, and is therefore used in the first place for cheap clothing, particularly for shoddy goods.

The following dyestuffs come chiefly into consideration:

For bright navy and dark blues:

Formyl Violet S4B, 10B
Alkaline Violet CA, C
Water Blue B, R, RB
Wool Blue TB.

For dull navy and dark blues:

Solid Blue R, 3R.

For navy and dark blues of very good fastness to light:

Lanacyl Blue BB, R
Lanacyl Navy Blue B, BB
Lanacyl Violet B.

Method of Dyeing.

Dye either according to the one-dip method with the addition of sulphate of iron, sulphate of copper and oxalic acid, or, by the two-bath method on a mordant of chrome and tartar, or of chrome, copper and sulphuric acid.

The dyeings produced according to the one-dip method work out at a somewhat lower cost than those dyed on chromed goods; the latter have on the other hand the advantage of greater brightness and better fastness to rubbing.

A. Dyeing according to the one-dip method.

One-dip Method.

Charge the dyebath first with

4 % sulphate of iron,
2 % sulphate of copper and
30—50 % Logwood chips;

then add sufficient oxalic acid (about 1½—2 % of the weight of the goods) to dissolve the precipitate formed in the bath and to make the liquor assume a yellowish colour. Then add the requisite quantity of Acid Colour in solution.

Enter the wetted out goods at about 60° C. (140 deg. F.), raise in ½ hour to the boil, boil for 1 hour, and exhaust, if necessary, with the addition of ½—1 % oxalic acid well diluted with cold water.

After dyeing, rinse very thoroughly, or if necessary wash with fuller's earth with the addition of some acetic acid.

Should a subsequent shading with Acid Colours be required, the dyebath must first be cooled off somewhat, and then be re-heated gradually after the addition of the dyestuff.

B. Dyeing according to the two-bath method.

Two-bath Method.

Mordant the goods as usual for 1½ hours at the boil with

3 % bichromate of potash and
2½ % tartar, or with
3 % bichromate of potash,
1½ % sulphate of copper and
1½ % sulphuric acid,

then rinse well, and dye in a fresh bath.

Charge the dyebath first with the requisite quantity of the Acid Colour and Logwood, enter at 60° C. (140 deg. F.), raise in ½ hour to the boil, and exhaust the bath after ¾ hour's boiling by the gradual addition of

3—5 % acetic acid or
1—1½ % sulphuric acid;

then rinse thoroughly.

Acid Colours may be used for subsequent shading, as stated under A.

Brilliant Cochineal and Scarlet in Combination with Natural Cochineal.

Cochineal Combination.

The combination of Brilliant Cochineal and Scarlet with natural Cochineal has recently found great favour for the dyeing of scarlet uniform cloths.

The advantages offered by this combination over pure Cochineal dyeings are principally the following:

1. The dyeings possess considerably better fastness to light and alkalies. Especially the fastness to light is far superior than that of dyeings produced with Cochineal and Flavine.
2. The goods are penetrated far better, and the dyeings turn out more uniform in shade.
3. The combination can be shaded easily, and any given shade may therefore be matched with greater certainty.

The dyestuffs coming into consideration for the combination, in the first place are:

Brilliant Cochineal 2R, 4R
Scarlet FR, F2R, F3R

which, according to the shade to be produced, are either used as self colours or mixed with one another. Pronounced yellow scarlets may be shaded with Orange R or Acid Yellow AT, and bluish reds with Rosazeïne B.

The method of working is as follows:

First boil out the well washed and if necessary bleached goods with

2 % oxalic acid and
4 % sulphuric acid,

rinse lightly.

Then prepare a fresh, short bath with, say,

3—5 % Cochineal (previously ground and tied up in a
4 % tartar, and [linen bag),
2 % tin crystals,

boil the bath up for 10 minutes, fill up with cold water, and add finally about

1 % Brilliant Cochineal 2R and
1 % Scarlet F2R

in solution. Enter the goods at about 40° C. (105 deg. F.), raise in ¾ hour to the boil, lift the bag containing the Cochineal, and boil for another 30—40 minutes.

Should the shade be too light still, cool off the bath, add some dyestuff, raise again gradually to the boil, and boil for a short while. It should however not be lost sight of that a prolonged boiling turns the shade somewhat yellower and that by the subsequent finishing of the goods the shades turn out somewhat paler and brighter.

After dyeing, rinse very thoroughly in soft water.

In order to produce bright shades, it is imperative to use pure water and absolutely clean dye vessels. Vats made of wood, tin or tinned copper are best; copper steam coils, or other parts made of copper, brass or iron are apt to cause spotty dyeings and should be avoided or, if necessary, be tinned.

The goods must be clean and a pure white; very yellowish goods are best bleached before dyeing with peroxide of hydrogen or peroxide of sodium.

Hot drying and pressing makes the shade of Cochineal duller and bluer; it is therefore best to dry the goods at 30—40° C. (85—105 deg. F.) and to press them at a moderate heat.

The Dyeing of Woollen Piece-goods with white Silk Effect Threads.

Woollen Goods with Silk Effects.

For the production of white silk effects in woollen goods dyed in the piece, it is necessary to select the dyestuffs best adapted for the purpose and to employ a suitable method of dyeing.

Low acidity and a high temperature of the dye liquor are favourable to the production of very clear silk effects, whereas the silk will be more or less stained if the goods are dyed in strongly acid baths or below the boil.

In order to have the temperature of the dyebath as high as possible, it is advisable to fix a second steam coil in the dye vat, preferably in the main part of the vat in which the goods are running.

I. The Dyeing of Ladies' Dress Goods.

Ladies' Dress Goods with Silk Effect Threads.

This class of goods are dyed either with the addition of acetic acid or formic acid; the latter is somewhat cheaper and effects a better exhaustion of the dyebaths. The application of bisulphate of soda or sulphuric acid should be avoided in order to prevent the silk from becoming stained.

The following dyestuffs, and their combinations, are best suited for dyeing these goods:

For compound shades (greys, modes, browns, olives):

Combinations of

Acid Yellow AT
Naphtol Yellow S
Orange G G
Lanafuchsine S G
Azo Wool Blue C.

For slates also combinations of:

Cyanole extra, FF
Lanafuchsine SG, SB.

For cream, yellow and orange:

Naphtol Yellow S
Acid Yellow AT
Fast Yellow S
Orange GG
Lanafuchsine SG (for shading towards red).

For pink:

Eosine 3G, BN
Eosine Scarlet B
Lanafuchsine SG, SB
Brilliant Scarlet 4R, 6R.

For red and claret:

Lanafuchsine SG, SB, 6B } especially suited
Brilliant Scarlet 4R }
Brilliant Scarlet 6R
Crystal Scarlet 6R
Scarlet FR, F2R, F3R
Brilliant Cochineal 2R
Naphtol Red C } especially suited
Amaranth }
Acid Magenta (in pale shades).

For purple:

Azo Wool Violet 7R
if necessary shaded with
Azo Wool Blue C
Cyanole FF (for bright, pale shades).

For blue and navy:

Cyanole FF, extra (for pale blue)
Azo Wool Blue C

for navy and dark blue, shaded with

Lanafuchsine 6B
Azo Wool Violet 7R
Orange GG
Acid Yellow AT.

For green:

Acid Green extra conc. } for bright, pale shades
Acid Green 5G }
Naphtol Green B
if necessary shaded with
Azo Wool Blue C
Acid Yellow AT
Orange GG.

For black:

Naphtylamine Black EFF
if necessary shaded with
Azo Wool Violet 7R (for bright blue black)
Acid Yellow AT } for jet black.
Orange GG }

A. Method of Dyeing in Colours, with the exception of such Pinks and Reds as are produced with Eosine or Eosine Scarlet.

Method of Dyeing in Colours.

Charge the dyebath with

10 % Glauber's salt crystals and
8 — 15 % acetic acid of 30% (according to the depth of shade)

or

10 % Glauber's salt crystals and
1¼ — 2½% formic acid of 85% (according to depth of the shade)

and the requisite quantity of dyestuff; enter the goods direct at the boil, and boil severely for about 1 hour. Then rinse thoroughly and sour off in the last rinsing bath with some acetic or formic acid.

For Eosine and Eosine Scarlet charge the dyebath with

10% Glauber's salt crystals,
2 — 5% acetic acid of 30% and the dyestuff.

Enter the goods at 50—60° C. (120—140 deg. F.), raise within 1/2 hour to the boil, boil for 30—40 minutes, rinse and brighten as afore stated.

Cleaning the silk.

Cleaning the Silk in Ladies' coloured Goods.

Dyed in pale and medium shades, the dyestuffs and combinations enumerated before leave silk effect threads perfectly white. When dyeing dark shades, the silk will not always show the desired whiteness, and it may then be necessary to clean the silk by stripping the colour fixed on the silk fibre.

The pieces are entered for this purpose into a fresh bath of 60—80° C. (140—175 deg. F.), previously charged according to the hardness of the water with 1/2—1 oz oxalate of ammonia per 100 gallons liquor, allowed to run in this bath for 10—20 minutes until the silk is sufficiently stripped, then rinsed, and brightened.

The addition of oxalate of ammonia can of course be dispensed with when using very pure or condensed water.

More effective stripping may if necessary be attained by adding about 1 1/2 oz acetate of ammonia*) per 10 gallons liquor; bran is similarly effective.

When working according to the first mentioned process, the wool does not lose in colour or only very little; some of its colour is however lost when employing the second, more effective method of stripping, which has to be taken into account in dyeing.

B. Method of Dyeing Black.

Method of Dyeing Black.

Charge the dyebath with

10 % Glauber's salt crystals,
2 % formic acid 85 % and
8 % dyestuff (for instance Naphtylamine Black EFF),

enter the goods at boiling temperature, boil for 3/4 hour, add

2 % formic acid 85 %

in several portions, and run for another 20—30 minutes in the strongly boiling bath. Then rinse, and brighten the bluish

*) Details for preparing acetate of ammonia are given on page 114.

coloured silk with a hydrosulphite solution according to the following directions:

Prepare a bath of 50—60° C. (120—140 deg. F.) with

$2^1/_2$ — 3 gallons acetic acid 30 %
4 —5 „ hydrosulphite solution*) } per 100 lbs of goods

enter the goods at once, working them until the silk has become sufficiently white (in about 20—30 minutes). Then rinse very thoroughly, sour off in a bath containing about 5 % sulphuric acid, calculated on the weight of the goods, rinse again, and brighten finally with acetic or formic acid.

If necessary the silk may be lightly blued in the brightening bath with slight quantities of Formyl Violet, Brilliant Milling Blue or Water Blue.

It is advisable to expose the goods as little as possible to the air during the stripping process, but to wholly immerse them in the stripping liquor, and to move them slowly to and fro with a stick.

II. Dyeing of Gentlemen's Suitings.

Gentlemen's Suitings with Silk Effect Threads.

The number of the dyestuffs suitable for the dyeing of gentlemen's suitings containing silk effect threads is comparatively a limited one owing to the high degree of fastness usually demanded of this class of goods.

For compound shades and blacks, our Anthracene Colours are in the first place to be recommended, for navy and dark blue our Anthracene Chrome Blue F as well as the special brand "Dark Blue WS", which latter, in addition to good fastness, offers the advantage of a simple method of dyeing and a low cost.

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*) Preparation of the hydrosulphite solution:
10 lbs bisulphite of 61° Tw. are mixed with
10 „ cold water, into which
1 lb zinc dust is introduced whilst stirring.

Stir for some time, allow to settle, filter if necessary, and use the clear solution.

As the hydrosulphite solution decomposes easily and thus becomes ineffective, it should always be prepared afresh and be added to the bath only just before entering the goods.

The following dyestuffs and their combinations are best suitable for dyeing these goods:

For compound shades (grey, mode, brown, olive):

Combinations of

Anthracene Yellow BN
Anthracene Chrome Violet B (as a reddening agent)
Anthracene Chrome Blue F.

Method of Dyeing Compound Shades.

Method of Dyeing: It is advantageous to dye on a chrome mordant, because this yields the clearest silk effect threads.

Mordant the goods in the ordinary manner for 1½ hour at the boil with

2 —3 % bichromate of potash and
1½—2½% tartar,

according to the depth of shade to be dyed; rinse, and dye in a fresh bath with the addition of

2—5% acetic acid or
5% acetate of ammonia*) (for very pale shades)

Enter the goods at 40—50° C. (105—120 deg. F.), raise in ½ hour to boiling temperature, and boil well for 1½—2 hours. In the case of dark shades add gradually, after 1 hour's boiling,

2—4% acetic acid,

as may be required, in order to exhaust the baths.

After dyeing, rinse the goods well, and finally sour off thoroughly with acetic or formic acid.

For subsequent shading, in case only slight quantities are required, the following colours are used:

Acid Yellow AT
Orange GG
Lanafuchsine SG
Azo Wool Blue C,

which may be added straight to the boiling bath. If, however, the shading has to be done with Anthracene Colours, the bath must be cooled off first, and then gradually be brought to the boil again.

*) Details for preparing acetate of ammonia are given on page 114.

Navies and Dark Blues.

For navies and dark blues the following are especially suited:

Dark Blue WS
if necessary shaded with
Lanacyl Blue BB, R
Lanacyl Violet B

and for shades which are required to be exceedingly fast to light, alkalies and perspiration:

Anthracene Chrome Blue F
if necessary shaded with
Anthracene Chrome Violet B.

Method of Dyeing Dark Blue WS.

Charge the dyebath with

10% acetate of ammonia,
5% acetic acid 30% and, say,
4–5% Dark Blue WS;

enter the goods at the boil, and exhaust the bath, after 1 hour's severe boiling, by the gradual addition of 5–8% acetic acid. Then rinse, and finally sour off well with acetic or formic acid.

The following dyestuffs are best suited for subsequent shading:

Azo Wool Blue C
Lanafuchsine SG
Azo Wool Violet 7R
Orange GG,

and may be added without hesitation to the boiling liquor.

Method of Dyeing Anthracene Chrome Blue F.

Mordant the goods as usual for 1½ hour at the boil with

3–4% bichromate of potash
2½–3% tartar;

then rinse, and dye in a fresh bath with about

3% Anthracene Chrome Blue F and
5% acetic acid.

Enter at about 70° C. (160 deg. F.), raise in 20 minutes to the boil, add after 1 hour's severe boiling

5–7% acetic acid

in several portions, and work for another 3/4 to 1 hour in the strongly boiling bath. Finally rinse the goods well, and brighten.

Regarding the subsequent shading see the remarks on page 270 relating to compound shades.

Black.

Black on Gentlemen's Suitings with Silk Effect Threads.

Anthracene Acid Black ST has proved eminently well suited for Blacks on this line of goods. It leaves silk effect threads very clear, and when dyed correctly, a subsequent cleaning of the silk is unnecessary.

For the production of a bright Blue-black, Anthracene Acid Black ST may be shaded with some Lanacyl Violet.

The fastness of the dyeings answers the most exacting demands in every respect.

Charge the dyebath, which must not contain a quantity of water more than 40 times the weight of the goods, with

10 % Glauber's salt crystals,
1 1/4 % formic acid 85 % and
8—9 % Anthracene Acid Black ST,

enter the goods at the boil, add after 3/4 hour's severe boiling

1 1/4 % formic acid 85 %

and run for another 45 minutes in the strongly boiling bath.

Then rinse the material thoroughly in cold water, enter into a fresh, boiling bath charged with

2 1/2 % formic acid 85 % (of the weight of the goods),

add after 1/2 hour's boiling

2 % bichromate of potash,

and run at the simmer for another 30 minutes.

Then rinse, and finally sour off well with formic acid.

Dyeing subsequent lots in the old bath. The dyebath only partly exhausts and can therefore to advantage be used over again.

For each subsequent lot to be dyed in the old bath, the latter is replenished with

3 % Glauber's salt crystals and
4 1/2 — 5 % Anthracene Acid Black ST;

enter the goods into the boiling bath, after 3/4 hour's severe boiling add

1 1/4 % formic acid 85 %,

and allow to run for another 3/4 hour in the strongly boiling bath.

Then rinse and aftertreat in the same manner as stated for the first lot.

Stripping of the Silk in Gentlemen's Suitings.

If in single cases not perfectly clear, the silk may be cleaned subsequently. For this purpose a bath is charged per 100 gallons with 1/4 — 1/3 gallon acetate of ammonia*), the goods being worked therein for 20 — 30 minutes. For goods dyed with Anthracene Colours the stripping bath is applied at the boil, and at 60 — 80° C. (160 — 175 deg. F.) for such dyed with Dark Blue WS.

The goods are then rinsed and soured off with acetic acid.

*) Details for preparing acetate of ammonia are given in the footnote on page 114.

Increasing the Fastness to Water by a subsequent Treatment with Tannic Acid.

The fastness to water of most dyestuffs is considerably improved by a simple treatment of the dyed goods with tannic acid.

A treatment of this kind is particularly important for dyeings of cloth for facings (for instance greens dyed with Brilliant Milling Green or Cyanole Fast Green) and for bunting.

The method of working is as follows:

The dyed and rinsed goods are treated for 20—30 minutes in a short bath heated to 30° C. (85 deg. F.) containing

8 oz pure tannic acid per 10 gallons liquor,

and then hydroextracted and dried without rinsing.

The shade is not changed at all or only very slightly so. For bright shades it is advisable to use as pure a quality of tannic acid as possible.

Wool Dyestuffs showing a yellow Nitric Acid Test.

The dyeings of the following products, when spotted with concentrated nitric acid, yield the so-called Indigo test, i. e. they show a yellow spot:

Acid Yellow AT
Eosine, all brands
Rosazeïne B, 13 (reddish yellow spot)
Lanafuchsine 6B, Azo Wool Violet 7R } yellowish orange spot
Cyanole, all brands with the exception of BN and BB
Tetra Cyanole, all brands
Cyanole Fast Green G, Acid Green, all brands, Fast Acid Green BN, Formyl Blue B } reddish yellow spot
Formyl Violet S4B, S5B, Alkaline Violet CA, C } yellowish orange spot
Anthracene Acid Blue D.

The Dyeing of Wool and Fur Felt Hats.

Our

Anthracene Chrome Black, patented,

bears further the abbreviated name of

"Crown Black"

and is also under this denomination very well known to the trade.

The different brands may be referred to equally well as:

Crown Black F	or Anthracene Chrome Black F
Crown Black FE	or Anthracene Chrome Black FE
Crown Black 5B	or Anthracene Chrome Black 5B
Crown Black P extra	or Anthracene Chrome Black P extra
Crown Black PR extra	or Anthracene Chrome Black PR extra
Crown Black PF extra	or Anthracene Chrome Black PF extra.

The Dyeing of Wool and Fur Felt Hats.

The Dyeing of Wool and Fur Felt Hats.

General Remarks.

Hats are dyed either ready-milled, in the form of soft or stiff hat bodies, or in the half-milled state as shapes or as settled felt.

For mixture felts (melanges), the material (wool or fur) is dyed in the loose state, as described on page 308 and in the chapter on "The Dyeing of Loose Wool" (pages 107—131).

Dye vessels.

As dye vessels, wooden vats with a false bottom, or copper vessels are used; the latter may be heated either with direct or indirect steam, or by a fire beneath the vessel. The paddle wheels have also proved of excellent value; by the revolution of the wheel, the working of the hats otherwise necessary when dyeing in the dye vessel may be dispensed with.

More recently, the dyeing machines of Mehler and Rey have been adopted in the hat industry, because they effect a saving in manual labour and preserve the original qualities of the material.

Wetting out before Dyeing.

Before dyeing, the hats, shapes or felts must be wetted out well in hot water. If the material contain a large amount of acid, some ammonia is frequently added to the wetting bath, or the goods are boiled for 15—20 minutes in water and rinsed again if necessary in fresh water. Soap-milled wool felts should likewise be thoroughly wetted out before dyeing; if they contain any soap residue, they should be wetted out with the addition of some ammonia and finally rinsed in fresh water.

Dyestuffs.

The following groups of dyestuffs are used for dyeing:

1. Acid Colours,
2. Chrome Colours (Anthracene Chrome and Anthracene Acid Colours),
3. Diamine Colours.

On account of their simple method of application and excellent penetrating properties, the Acid Colours occupy the first

position in hat dyeing. They are not only of primary importance for the dyeing of ladies' and children's hats, but are also used generally for dyeing black and coloured hats for gentlemen's wear.

In point of fastness to steaming, hot pressing, perspiration and exposure, dyeings produced with Acid Colours satisfy quite generally all normal requirements. If the demands in respect to fastness are especially high, or if the hats are subjected to an alkaline rinsing after dyeing and stiffening, Anthracene Chrome and Anthracene Acid Colours are employed. The Anthracene Colours are likewise of importance for the dyeing of stiffened hat bodies.

The Diamine Colours, particularly Diamine Fast Red and Diamine Scarlet, serve for the production of reds fast to light, perspiration and alkalies, especially for fez caps.

Methods of Dyeing.

A. Fancy Shades.

I. Fancy Shades on soft, ready-milled Ladies' and Gentlemen's Hats (Wool and Fur Felts).

1. Methods of Dyeing Acid Colours.

a) Levelling colours which may be used even for light compound shades:

Fast Yellow S, Acid Yellow AT, Indian Yellow, Tropaeoline, Naphtol Yellow, Orange, Azo Orseille, Lanafuchsine, Acid Magenta, Rosazeïne, Acid Violet, Azo Wool Violet, Cyanole, Tetra Cyanole, Blue PC (No 9623), Indigo Blue, Azo Wool Blue, Azo Navy Blue, Acid Navy Blue, Acid Green, Fast Acid Green, Cyanole Green and Cyanole Fast Green.

Charge the bath with

10—20% Glauber's salt crystals and the dyestuff.

Enter the well wetted bodies at 50° C. (120 deg. F.); in case they still contain a large amount of acid, they should be

boiled out previously. Raise in 1/2 hour to the boil, and boil for about 30—40 minutes until the hats are dyed through; then add

1—2 % sulphuric acid, and, after further 1/4—1/2 hour's boiling, another

2—4 % sulphuric acid or a corresponding quantity of bisulphate of soda,

turning the hat bodies at the same time inside out, and boil for another 20—30 minutes until the bath is exhausted.

In the case of light bodies or of soap-milled bodies, it is well to add, in addition to the Glauber's salt,

1 —1 1/2 % sulphuric acid or

2 1/2—4 % bisulphate of soda

immediately on entering the dyebath, and then to work as above described.

The following method of dyeing, with only a short boiling, has also proved satisfactory for some classes of felts:

Work the hats for about 3/4 hour in a cold bath charged with Glauber's salt, the dyestuff and 4—6 % sulphuric acid, then raise the temperature gradually to the boil, and finish dyeing by boiling for 3/4—1 hour.

In place of sulphuric acid, bisulphate of soda may be used equally well, 1 part by weight of concentrated sulphuric acid (D. O. V.) corresponding to about 2 1/2—3 parts bisulphate of soda.

Fur hats and bright finished wool hats are dyed at the simmer, with not more than 10 % Glauber's salt or often none at all, in order to avoid impairing their solidity or their lustre.

For details regarding the subsequent shading see tables on pages 294—305.

b) Acid Colours used for self shades and dark compound shades.

Scarlet, Brilliant Scarlet, Crystal Scarlet, Brilliant Cochineal, Brilliant Orseille, Naphtol Red, Amaranth, Roccelline, Azo Rubine, Azo Red, Formyl Violet, Brilliant Milling Blue, Azo Merino Blue, Naphtol Blue, Naphtol Green and Brilliant Milling Green.

The method of dyeing is the same as stated for the aforementioned levelling colours (see sub a), the hats however being entered at a lower temperature and the bath raised more gradually to the boil.

Bodies containing a large amount of acid are best neutralised before dyeing by adding some ammonia to the liquor used for wetting out.

For details of subsequent shading see the instructions in the tables on pages 294—305.

c) For Alkaline Blue and Alkaline Violet.

First boil the hats (according to the amount of acid they contain) with 5—10 % borax,

so that the bath may react slightly alkaline until the finish; when the wet felts are cut, the interior should also show a slight alkaline reaction.

Then cool off the bath, add the requisite quantity of dyestuff, dye for about ¾ hour at the simmer, rinse thoroughly, and develop for 20—30 minutes in a fresh bath heated to about 50° C. (120 deg. F.) with the addition of

4—5 % sulphuric acid.

For soap-milled hats charge the dyebath with

3—5 % borax and the dyestuff,

enter the well wetted goods at about 60° C. (140 deg. F.), raise in 20 minutes to the boil, and continue as above stated.

Copper vessels should be avoided, because copper slightly dulls the shades.

2. Methods of Dyeing Chrome Colours.

For Anthracene Yellow, Anthracene Acid Brown, Anthracene Chrome Brown, Anthracene Chrome Red, Anthracene Chrome Violet and Anthracene Chrome Blue.

Ready-milled hats are chiefly dyed according to the two-bath method, though the one-dip method also yields very good results.

a) Two-bath method (Dyeing on a chrome mordant).

Mordant the well wetted goods for 1½ hour at the boil as usual with 2 —4 % bichromate of potash and
1½—3 % tartar
according to the depth of shade to be dyed, rinse, and dye in a fresh bath.

Enter the hats into the bath charged with the requisite quantity of dyestuff at about 40° C. (105 deg. F.), raise in ¾—1 hour to the boil, and boil for 1½ hour.

The dyebaths exhaust completely when dyeing pale and medium shades; for dark shades,

1—3 % acetic acid (according to requirement),

well diluted with water, may be added gradually in order to completely exhaust the bath.

b) One-dip method.

Charge the bath with

10—15 % Glauber's salt crystals,
1— 3 % sulphuric acid (according to the depth of the shade to be dyed and the degree of acidity of the hats) and the dyestuff.

Enter the well wetted hat bodies at about 40° C. (105 deg. F.), raise in about ¾ hour to the boil, and dye for 1 hour at boiling temperature. Then cool the bath off to 60—70° C. (140—160 deg. F.), add the requisite quantity of bichromate of potash (about ⅔ of the weight of dyestuff), raise again gradually to the boil, and work for another ½ hour at the boil.

Hats containing a large amount of acid, as for instance carbonised hat bodies, are before mordanting or dyeing best neutralised by the addition of some ammonia to the bath used for wetting out.

When dyeing in copper vessels, ½—¾ % sulphocyanide of ammonia (calculated on the weight of the hats) is added to the dyebath of 40° C. (105 deg. F.), the liquor stirred well and then left standing for 20 minutes before adding the Glauber's salt, acid and dyestuff.

For details of subsequent shading see the tables on pages 294—305.

3. Method of Dyeing Diamine Colours (principally for fez caps).

For Diamine Scarlet, Diamine Fast Red, Diamine Fast Yellow and Diamine Yellow.

Charge the bath with

10—20 % Glauber's salt crystals,
5 % acetate of ammonia*) and the dyestuff.

Enter the well wetted goods at 40—50° C. (105—120 deg. F.), raise in about 3/4 hour to the boil, and boil for 1—1 1/2 hour.

The baths may, if necessary, be completely exhausted by the addition of

2—5 % acetic acid (well diluted with water),

but this method is generally resorted to only in the case of Diamine Fast Red shades to be afterchromed and of combinations of Diamine Fast Red and Anthracene Colours.

The afterchroming is carried out by adding to the exhausted dyebath, which has been cooled off somewhat,

1—2 % bichromate of potash (about half the quantity of dyestuff) or
2—3 % chromium fluoride (same weight as of dyestuff)

and treating the goods therein for about 1/2 hour at the simmer.

Any acid still contained in the goods must before dyeing be well neutralised with ammonia.

For details of subsequent shading see pages 300 and 301 of the tables.

II. Fancy Shades on stiffened Wool and Fur Felts.

1. Method of Dyeing Levelling Colours.

The following come chiefly into consideration:

Acid Yellow AT, Indian Yellow FF, Tropaeoline 00, Orange GG, II, extra, Azo Orseille BE, BB, Lanafuchsine SG, SB, Cyanole extra, Tetra Cyanole V, Cyanole Green B, 6G and Cyanole Fast Green G.

*) Details for preparing acetate of ammonia are given in the footnote on page 114.

Charge the bath with

5—10 % Glauber's salt crystals,
2— 4 % sulphuric acid or } according to the depth of shade
5—10 % bisulphate of soda }
and the dyestuff.

Enter the well wetted out bodies at 70–80° C. (160–175 deg. F.), raise in 20 minutes to the boil, and keep at the simmer for about 1 hour; when dyeing dark shades, the bath may, if necessary, be exhausted by the addition of some sulphuric acid or bisulphate of soda.

For details of subsequent shading see the tables on pages 294—305.

2. Method of Dyeing Chrome Colours.

For Anthracene Yellow, Anthracene Acid Brown, Anthracene Chrome Brown, Anthracene Chrome Red, Anthracene Chrome Violet and Anthracene Chrome Blue.

Mordant the hat bodies as usual for 1—1¼ hour at the boil with

2 —3 % bichromate of potash } according to the depth of shade to be dyed,
1½—2½ % tartar }

rinse, and dye in a fresh bath.

Enter the goods into the dyebath, charged with the requisite quantities of dyestuff, at 60—70° C. (140—160 deg. F.), raise in ½ hour to the boil, and dye for about 1½ hour at the simmer.

In the case of dark shades,

2—4 % acetic acid

well diluted with water may then be added gradually in order to better exhaust the bath.

When dyeing in copper vessels, the dyebath is first charged with

½—¾ % sulphocyanide of ammonia (of the weight of the goods), stirred well, and left standing for 20 minutes before adding the dyestuff.

For details of subsequent shading see the tables on pages 294—305.

III. Fancy Shades on Shapes and Settled Felts (Fur or Wool Felts.)

1. Methods of Dyeing Acid Colours.

a) For the Levelling Colours enumerated on page 280.

Charge the bath with

5—10 % Glauber's salt crystals,
2— 4 % sulphuric acid (according to the depth of the shade) and the dyestuff.

Enter the well wetted out goods at 50–60° C. (120–140 deg. F.), raise in 20 minutes to the boil, and dye for ½—1 hour at the simmer. In the case of deep shades it is advisable to add some more sulphuric acid in order to better exhaust the bath.

For details of subsequent shading see the tables on pages 294—305.

If the hat bodies contain much acid over from the milling process, proportionately less acid should be added.

Levelling colours in combination with earth colours for the production of light beige shades and pale drabs are dyed by previously grinding the earth colour to a thin paste with hot water, and adding it just before the termination of the dyeing process, then working the goods well for about another 10 minutes. In some works the earth colours are applied in the fulling stocks only.

b) For the Acid Colours enumerated on page 281.

The method of dyeing is the same as stated for the levelling colours (sub a); it is however expedient to start at a lower temperature and raise more gradually to the boil.

Pale shades, such as silver-grey and pale grey, are produced with Formyl Violet, Acid Violet or Brilliant Milling Blue in combination with earth colours, 5—10 % Glauber's salt but no acid being added.

c) For Alkaline Blue and Alkaline Violet.

The method of dyeing is the same as stated on page 282 for ready-milled hats.

2. Methods of Dyeing Chrome Colours.

For Anthracene Yellow, Anthracene Acid Brown G, Anthracene Chrome Brown, Anthracene Chrome Red, Anthracene Chrome Violet and Anthracene Chrome Blue.

The Anthracene Colours are dyed on shapes and settled felts either according to the one-dip method or according to the two-bath method on chromed material.

Especially when dyeing pale shades or nearly ready milled shapes the second method is given the preference.

a) One-dip method.

Charge the bath with

1— 3 % sulphuric acid (according to the depth of the shade to be dyed and the acidity of the goods) and the dyestuff;

or, for thicker shapes, with

5—10 % Glauber's salt crystals,

1— 3 % sulphuric acid

and the dyestuff.

Enter the well wetted out goods at 40–50° C. (105–120 deg. F.), raise in 1/2 hour to the boil, and dye for 1/2—1 hour at the simmer. Then cool the bath off somewhat, add the requisite quantity of bichromate of potash (about two-thirds of the weight of dyestuff), raise again gradually to the boil, and continue for another 1/2 hour at the simmer.

b) Dyeing on a chrome mordant.

The wetted out felts or shapes are mordanted for 3/4 hour at the simmer, according to the depth of shade, with

2 —4 % bichromate of potash and

1 1/2—3 % tartar

(shapes for about 1 1/4 hour), rinsed in water, and dyed in a fresh bath.

Enter the goods at 40—50° C. (105—120 deg. F.) into the bath charged with the requisite quantity of dyestuff (and 2 % acetic acid in the case of dark shades), raise in 1/2 hour to the boil, and dye for 3/4—1 1/4 hour at the simmer.

The baths may then be exhausted by gradually adding, according to requirement,

1—4 % acetic acid

well diluted with water.

Goods containing a large amount of acid are best neutralised, before mordanting with bichromate of potash, by adding some ammonia to the bath used for wetting out. When dyeing according to the one-dip method, proportionately less acid is added or none at all.

When dyeing in copper vessels, the bath is heated to 40—50° C. (105—120 deg. F.) and charged with 1/2—3/4 % sulphocyanide of ammonia; after stirring well it is then allowed to stand for 20 minutes before adding the Glauber's salt, acid and dyestuff.

For details of subsequent shading see the tables on pages 294—305.

Combinations with earth colours for the production of light beige, pale drab, silver grey and light grey shades may be dyed like the levelling colours (see page 286); it is however more advantageous to add the earth colours into the fulling stocks only.

3. Method of Dyeing Diamine Colours.

For Diamine Scarlet, Diamine Fast Red, Diamine Fast Yellow and Diamine Yellow.

The method of dyeing is the same as detailed on page 284 for ready-milled soft hat bodies. Before dyeing, the goods should be neutralised with ammonia.

B. Black.

I. Black on soft, ready-milled Ladies' and Gentlemen's Hats (Wool and Fur Felts).

1. Method of Dyeing Acid Blacks.

For Hat Black, Naphtylamine Black, Naphtol Blue Black, Naphtol Black and Azo Merino Black.

Charge the bath with

5—15 % Glauber's salt crystals (according to the compactness of the hat bodies) and the dyestuff.

Wet out the goods thoroughly in boiling hot water, or boil them out if they contain a large amount of acid. Enter at about 60° C. (140 deg. F.), raise in 20—30 minutes to the boil, and continue boiling for about ¾—1 hour until the hats are dyed through. Then add

1 —2 % sulphuric acid or
2½—5 % bisulphate of soda,

boil ¼ hour more, and add according to requirement further

1—4 % sulphuric acid or the corresponding quantity of bisulphate of soda

well diluted with water; continue boiling until the bath is exhausted.

For wool felts milled with soap add besides the 10 % Glauber's salt

5 % acetic acid or
1—1½ % sulphuric acid,

following otherwise the same directions as above stated.

Before dyeing, the wool felts must be thoroughly wetted out in boiling hot water, to which some ammonia should be added in case the hats contain any soap residue.

Suitable shading products are enumerated in the tables on page 306.

2. Method of Dyeing Chrome Black.

For Anthracene Chrome Black, Hat Chrome Black and Anthracene Acid Black.

Charge the dyebath, according to the hardness of the water, first with

5—10 oz oxalate of ammonia*) per 100 gallons liquor, stir well, add

10 % Glauber's salt crystals and the dyestuff,

and enter the wetted out hats at 50—60° C. (120—140 deg. F.).

*) Details for preparing oxalate of ammonia are given in the footnote on page 112.

Raise in 20 minutes to the boil, continuing to boil for ½—1 hour until the hats are dyed through; then add in several portions

for wool felts 3—4 % sulphuric acid,
for fur felts 4—6 % sulphuric acid,

well diluted with water, and boil for another 20 minutes after the last addition.

Then chrome in a fresh liquor with the addition of

2—2½ % bichromate of potash and
2 % hydrochloric acid

for 30—40 minutes at a gentle boil. A rinsing of the felts before chroming is not necessary, it is sufficient to let them drain off well.

In the case of soap-milled wool felts

3—5 % acetic acid,

or for Anthracene Acid Black SR,

1—2 % sulphuric acid,

are added to the dyebath, besides the Glauber's salt, proceeding otherwise as stated above for acid-milled hats.

The wool felts must be well wetted out before dyeing; the wetting out should be done with the addition of some ammonia if the felts contain any soap residue.

The suitable shading products are given in the tables on page 307.

The addition of oxalate of ammonia may be omitted when dyeing Anthracene Chrome Black 5B, Hat Chrome Black and Anthracene Acid Black DSF, DSFB and SR. When dyeing Anthracene Acid Black SR in copper vessels, the dyebath is first charged at a temperature of 50—60° C. (120—140 deg. F.), with ½—¾ % sulphocyanide of ammonia (of the weight of the hats),

stirred well, and left standing for 20 minutes before adding the Glauber's salt, acid and dyestuff.

Both the dyebath and the chroming bath may be used again for subsequent lots.

When dyeing in the standing bath, the bath is first cooled off with cold water, and then partially neutralised by the addition of

about 2 % ammonia;

the dyestuff is then added and the new lot dyed exactly like the first one.

Fur hats, the baths of which do not exhaust, require in the subsequent baths 2 – 3 % less dyestuff than in the starting bath.

The additions of chrome and hydrochloric acid may likewise be reduced for the second and subsequent baths by about one-third of those used for the first lot.

II. Black on stiffened Wool and Fur Felts.

1. Method of Dyeing Chrome Blacks.

For Hat Chrome Black, Anthracene Chrome Black and Anthracene Acid Black.

Charge the bath with

1 %, or at the most 2 % sulphuric acid, and the dyestuff.

(When using Anthracene Chrome Black F or combinations of same, the bath must first be neutralised by the addition of oxalate of ammonia, as described on page 289 for the dyeing of soft hats).

Enter the well wetted out felts at 70 – 80° C. (160—175 deg. F.), and raise immediately to boiling point; after ½ hour's moderate boiling add

2 — 4 % sulphuric acid

well diluted with cold water, in two portions, and boil gently for another ¼ hour after the last addition. Then lift the hats, allow the liquor to drain off, and chrome for ½ hour at a gentle boil in a fresh bath charged with

1½ — 2½ % bichromate of potash and
2 % hydrochloric acid.

Suitable shading products are enumerated in the tables on page 307.

Regarding the use of the old dyebaths and chroming baths for subsequent lots, the details given on page 291 for the dyeing of soft felts likewise hold good.

2. Method of Dyeing Acid Blacks.

For Hat Black and Naphtylamine Black.

Charge the bath with

1 % sulphuric acid and dyestuff.

Enter the well wetted out hats at 70° C. (160 deg. F.), and raise in about 20 minutes to the boil; boil gently for ½ hour, and then exhaust the bath by adding in several portions

2 — 4 % sulphuric acid

well diluted with water.

The baths should be thoroughly exhausted.

Suitable shading products are mentioned in the tables on page 307.

3. Method of Dyeing Naphtyl Blue Black in Combination with Logwood.

Mordant the hats with

3 % bichromate of potash
2 % sulphate of copper
2 % oxalic acid

for 1 — 1¼ hour at the simmer, rinse lightly, and dye in a fresh bath.

Charge the dyebath for jet black, for instance, with

6 % Naphtyl Blue Black N
½ % Indian Yellow G
6 % Logwood Extract (solid)
1 — 2 % oxalic acid (according to the hardness of the water).

Enter the mordanted hats at about 80° C. (175 deg. F.), raise at once to the boil, and complete dyeing in about 1¼ hour at a gentle boil.

III. Black on part planked Shapes.

In some instances black is also dyed on briefly milled shapes, which have then to be brought to the proper size by subsequent planking.

The dyestuffs and the method of dyeing applied are practically the same as with hat bodies, the instructions given on pages 288—290 thus holding good for this material also.

Repairing faulty or too deep Shades.

The method of working is the same as detailed on pages 254 and 255 for repairing faulty pieces.

Dyestuffs for Mode

(Grey, beige, drab, beaver,
(On Ladies' and Gentlemen's soft and stiff Hats,

Cheapest method of production

Combinations of:

Indian Yellow FF
Orange II, extra
Azo Orseille BE, BB
(for pale shades)
Lanafuchsine SB
(for deep shades)
Blue PC (No 9623)
Cyanole AB, BB.

The following dyestuffs are best suited for subsequent shading in the boiling bath:

Fast Yellow S
Orange GG
Azo Orseille BB
Tetra Cyanole V
Cyanole extra.

Of better fastness to light

Combinations of:

*Fast Yellow S
Acid Yellow AT
*Orange GG
*Azo Orseille BE, BB
(for pale shades)
Lanafuchsine SB
(for full shades)
Cyanole Green B, 6G
*Tetra Cyanole V
*Cyanole extra.

Somewhat better still in fastness to light are combinations of the following products:

*Fast Yellow S
Acid Yellow AT
Orange GG
Lanafuchsine SG
Cyanole Fast Green G.

The dyestuffs marked with an asterisk (*) are in the first place to be recommended for subsequent shading in the boiling bath.

The following dyestuffs serve for dyeing pale shades fast to milling on shapes or settled felts:

For light beige, pale drab, etc.

Orange GG, extra
Fast Yellow S
shaded with
Azo Orseille BB
Cyanole extra

For silver grey and light grey:

Formyl Violet S4B—10B
Acid Violet 6BC
Brilliant Milling Blue B

in combination with mineral colours:

ochre,
graphite or
talc.

The methods of dyeing are given on pages 280—288.

Shades on Hat Felts.

pale nutria, monlow etc.)
Hat Bodies and Shapes, Wool and Fur Felts.)

Excellently fast to light	Special properties of fastness
Combinations of: Anthracene Yellow BN Anthracene Acid Brown G Anthracene Chrome Brown D Anthracene Chrome Red A Anthracene Chrome Blue G, F.	Dyestuffs fast to steaming: All the dyestuffs may be considered excellently fast to steaming, with the exception of: Cyanole BB, the shade of which is turned somewhat greener on severe steaming.
The following serve for subsequent shading: For goods which are not stiffened: Fast Yellow S Orange GG Azo Orseille BB Tetra Cyanole V Cyanole extra. These dyestuffs may be added directly to the boiling bath.	Dyestuffs withstanding the alkaline stiffening and rinsing: Anthracene Yellow BN Anthracene Acid Brown G Anthracene Chrome Brown D Anthracene Chrome Red A Anthracene Chrome Blue, all brands Formyl Violet S4B Brilliant Milling Blue B.
For goods which are stiffened after dyeing: The above mentioned Anthracene Colours; the bath must be cooled off somewhat before the dyestuffs are added.	Dyestuffs withstanding the acid milling (dyeings on shapes): All the dyestuffs withstand the acid milling very well. The hat bodies must be very thoroughly rinsed after milling in order to remove the sulphuric acid.

The following dyestuffs serve for dyeing pale shades fast to milling on shapes or settled felts:

For light beige, drab, etc.

The above mentioned Anthracene Colours.

For light grey:

Anthracene Chrome Blue G, F
if necessary shaded with
Formyl Violet S4B—10B
Brilliant Milling Blue B

in combination with
ochre,
graphite, or
talc.

The methods of dyeing are given on pages 280—288.

Dyestuffs for Brown

(Havana, tobacco, maroon,
(On Ladies' and Gentlemen's soft and stiff Hats,

Cheapest method of production

Combinations of:

Indian Yellow FF, G, R
Tropaeoline 00, 0
Orange IV, II, extra
Lanafuchsine SG
Blue PC (No 9623)
Fast Acid Green BN.

For prune shades.

Combinations of:

Orange II, extra
Azo Wool Violet 7R, 4B
Blue PC (No 9623)
Cyanole AB.

Of better fastness to light

Combinations of:

Acid Yellow AT
Tropaeoline 00, 0
Orange IV, II, extra
Lanafuchsine SG
Cyanole Green 6G.

Still faster to light are combinations of:

Acid Yellow AT
Orange GG
Lanafuchsine SG
Cyanole Fast Green G.

For prune shades.

Combinations of:

Orange GG
Azo Wool Violet 7R
Tetra Cyanole V
Cyanole extra.

The following are the most important dyestuffs for subsequent shading in the boiling bath:

Fast Yellow S
Orange GG
Azo Orseille BB
Tetra Cyanole V
Cyanole Green B, 6G
Cyanole Fast Green G.

The methods of dyeing are given on pages 280—288.

Shades on Hat Felts.

coffee, loutre, etc.)
Hat Bodies and Shapes, Wool and Fur Felts.)

Excellently fast to light

Combinations of:

Anthracene Chrome Brown D
Anthracene Acid Brown G
Anthracene Yellow BN
Anthracene Chrome Red A
Anthracene Chrome Blue G, F, BB, R.

For prune shades.

Combinations of:

Anthracene Acid Brown G
Anthracene Chrome Red A
Anthracene Chrome Violet B.

The following serve for subsequent shading:

For goods which are not stiffened:

Fast Yellow S
Orange GG
Azo Orseille BB
Tetra Cyanole V
Cyanole Fast Green G.

These dyestuffs may be added directly to the boiling bath.

For goods which are stiffened after dyeing:

The above enumerated Anthracene Colours; the bath should be cooled off before adding the dyestuff.

Special properties of fastness

Dyestuffs fast to steaming:

All the dyestuffs may be considered as excellently fast to steaming.

Dyestuffs withstanding the alkaline stiffening and rinsing:

Anthracene Chrome Brown D
Anthracene Acid Brown G
Anthracene Yellow BN
Anthracene Chrome Red A
Anthracene Chrome Blue, all brands
Anthracene Chrome Violet B.

Dyestuffs withstanding the acid milling (dyeings on shapes):

All the dyestuffs withstand the acid milling very well.

The hat bodies must be well rinsed after milling in order to remove the sulphuric acid. This is especially necessary in the case of

Tropaeoline 00 and
Orange IV.

The methods of dyeing are given on pages 280—288.

Dyestuffs for Green and

(On Ladies' and Gentlemen's soft and stiff Hats,

Cheapest method of production	Of better fastness to light
Acid Green extra conc. Fast Acid Green BN Blue PC (No 9623) in combination with Indian Yellow FF, G Tropaeoline 00, 0 Orange IV, II, extra Lanafuchsine SG Azo Orseille BE, BB (for shading towards red) Azo Wool Blue SE (for saddening).	Cyanole Green B, 6G Cyanole Fast Green G in combination with Acid Yellow AT Tropaeoline 00, 0 Orange IV, II, extra Lanafuchsine SG Azo Orseille BE. BB (for slight reddening) Cyanole AB, extra.
For bright greens: Acid Green extra conc. Acid Green extra conc. B Acid Green 5G Fast Acid Green BN if necessary shaded with Naphtol Yellow S Tetra Cyanole V.	For shades excellently fast to light: Naphtol Green B shaded with Acid Yellow AT Orange GG Lanafuchsine SG Cyanole extra.

The following are the most important dyestuffs for shading in the boiling bath:

Fast Yellow S
Orange GG
Azo Orseille BB
Cyanole Green B, 6G
Cyanole Fast Green G
Tetra Cyanole V
Cyanole extra.

The methods of dyeing are given on pages 280—288.

Olive Shades on Hat Felts.

Hat Bodies and Shapes, Wool and Fur Felts.)

Excellently fast to light

Combinations of:

Anthracene Chrome Blue G, F, BB
Anthracene Yellow BN
Anthracene Acid Brown G
Anthracene Chrome Brown D
Anthracene Chrome Red A

if necessary brightened with

Brilliant Milling Green B
Cyanole Fast Green G.

The following serve for subsequent shading:

For goods which are not stiffened:

Fast Yellow S
Orange GG
Azo Orseille BB
Cyanole Fast Green G
Tetra Cyanole V.

These dyestuffs may be added directly to the boiling bath.

For goods which are stiffened after dyeing:

The above mentioned Anthracene Colours; the bath must be cooled off before adding the dyestuff.

Special properties of fastness

Dyestuffs fast to steaming:

All the dyestuffs may be considered excellently fast to steaming, with the exception of

Naphtol Green B,

the shade of which turns lighter and browner on severe steaming.

Dyestuffs withstanding the alkaline stiffening and rinsing:

Anthracene Chrome Blue, all brands
Anthracene Yellow BN
Anthracene Acid Brown G
Anthracene Chrome Brown D
Anthracene Chrome Red A.

For most purposes,

Brilliant Milling Green B or
Cyanole Fast Green G

are also sufficient.

Dyestuffs withstanding the acid milling (dyeings on shapes):

All the dyestuffs withstand the acid milling process very well.

The hat bodies must be rinsed thoroughly after milling in order to remove the sulphuric acid. This is especially necessary when using

Tropaeoline 00 or
Orange IV.

The methods of dyeing are given on pages 280—288.

Dyestuffs for Red, Claret and

(On Ladies' Hats, Caps and Fezzes.

Cheapest method of production

Scarlet EC
Roccelline.

For particularly brilliant light reds.

Combinations of:

Rosazeïne B, 13
Orange extra
Naphtol Yellow S.

For claret and garnet shades:

Azo Red A
Brilliant Orseille C
Acid Magenta
(for very bright shades).

Of very good fastness to light

For bright reds:

Brilliant Scarlet, all brands
Crystal Scarlet 6R
Scarlet FR, F2R, F3R
Brilliant Cochineal 2R, 4R
Lanafuchsine SG, SB.

For deeper reds:

Azo Rubine A
Naphtol Red EB.

For claret and garnet shades:

Naphtol Red C
Amaranth
Azo Orseille BB, BE
Lanafuchsine 6B
(for very bright shades).

Suitable shading products are:

Naphtol Yellow S
Acid Yellow AT
Indian Yellow FF
Orange II, extra
Rosazeïne B, 13
Azo Wool Violet 7R
Cyanole extra, AB
Tetra Cyanole V.

The following are best suited for subsequent shading in the boiling bath:

Fast Yellow S
Orange GG
Azo Orseille BB
Lanafuchsine SG, SB
Cyanole extra
Tetra Cyanole V.

The methods of dyeing are given on pages 280—288.

Garnet Shades on Hat Felts.

Hat Bodies and Shapes, Wool and Fur Felts.)

Of very good fastness to light and also fast to alkaline stiffening and rinsing

For bright reds:

Diamine Scarlet B, 3B
Diamine Fast Red F, dyed direct;
if necessary shaded with
Diamine Fast Yellow FF
Diamine Yellow CP.

Somewhat faster to alkalies:

Diamine Fast Red F, chromed;
if necessary shaded with
Anthracene Yellow BN.

For dull reds, clarets and garnets:

Diamine Fast Red F, chromed;
in combination with
Anthracene Yellow BN
Anthracene Chrome Violet B
Anthracene Chrome Blue F
or combinations of:
Anthracene Chrome Red A
Anthracene Chrome Violet B
Anthracene Chrome Blue F.

The following serve for subsequent shading:

For Diamine Colours:

The Diamine Colours enumerated above; the bath must always be cooled off somewhat before adding the dyestuff.

For dyeings produced with Anthracene Chrome Colours:

Fast Yellow S
Orange GG
Azo Orseille BB
Tetra Cyanole V

} for goods which are not stiffened. The dyestuffs may be added directly to the boiling bath.

For goods which are stiffened after dyeing, the same Anthracene Colours as above mentioned have to be employed. The bath must however be cooled off well before adding the dyestuffs.

The dyestuffs enumerated, especially Diamine Fast Red F, are extensively used as a substitute for Alizarine Red in the dyeing of fez caps.

Special properties of fastness

Dyestuffs fast to steaming:

All the dyestuffs are excellently fast to steaming, with the exception of:

Scarlet EC,

the shade of which turns somewhat yellower on severe steaming.

Dyestuffs withstanding the acid milling (dyeings on shapes):

All the dyestuffs withstand the acid milling very well.

The hat bodies must be rinsed very thoroughly after the milling in order to remove the sulphuric acid.

The methods of dyeing are given on pages 280—288.

Dyestuffs for Blue

(On Ladies' and Gentlemen's soft and stiff Hats,

Cheapest method of production	Of better fastness to light
For bright blues:	For bright blues:
Brilliant Milling Blue B Indigo Blue N Cyanole BB if necessary shaded with Acid Violet 6BS.	Alkaline Blue, all brands if necessary shaded with Alkaline Violet CA, C; further Cyanole FF, extra, AB Tetra Cyanole V, SF, extra if necessary shaded with Acid Violet 6BS.
For navy and dark blues:	For navy and dark blues:
Indigo Blue SGN Blue PC (No 9623) Acid Green extra conc. Fast Acid Green B, BN in combination with Azo Wool Violet 7R, 4B Acid Violet 6BS Lanafuchsine SB Orange II, extra (for saddening purposes).	Azo Wool Blue SE Azo Navy Blue B, 3B Acid Navy Blue A if necessary shaded with Azo Wool Violet 4B Acid Violet 6BS Orange GG, II, extra (for saddening purposes).
	Of still better fastness to light, especially for dark blue on fur felts:
	Azo Merino Blue 3B, G Naphtol Blue G.

All the dyestuffs enumerated may be used for subsequent shading in the boiling bath, with the exception of Brilliant Milling Blue B, Azo Merino Blue and Naphtol Blue.

Best suited for this purpose are the following products which level with great ease:

Cyanole, all brands
Tetra Cyanole, all brands
Indigo Blue N
Acid Violet 6BS
Azo Orseille BB
Orange GG.

The methods of dyeing are given on pages 280—288.

Shades on Hat Felts.

Hat Bodies and Shapes, Wool and Fur Felts.)

Excellently fast to light

Anthracene Chrome Blue F
Anthracene Chrome Blue G
Anthracene Chrome Blue BB
Anthracene Chrome Blue B
Anthracene Chrome Blue R.

Bright blues are shaded with:

Brilliant Milling Blue B
Formyl Violet S4B
Billiant Milling Green B.

Very deep dark blues are shaded with

Anthracene Acid Black DSF
(on chromed hats)
Anthracene Chrome Black 5B
(when dyeing according to the one-dip method).

The following serve for subsequent shading:

For goods which are not stiffened:

Cyanole extra
Tetra Cyanole V
Acid Violet 6BS
Azo Orseille BB
Orange GG.

These dyestuffs may be added directly to the boiling bath.

For goods which are stiffened after dyeing:

The Anthracene Colours enumerated above, Brilliant Milling Blue B, Formyl Violet S4B and Brilliant Milling Green B; the bath must be cooled off before adding the dyestuff.

Special properties of fastness

Dyestuffs fast to steaming:

All the dyestuffs are excellently fast to steaming, with the exception of

Cyanole BB
Anthracene Acid Black DSF,

the shade of which is somewhat changed on severe steaming.

Dyestuffs withstanding the alkaline stiffening and rinsing:

Anthracene Chrome Blue, all brands
Anthracene Chrome Black 5B
Anthracene Acid Black DSF
Brilliant Milling Blue B
Formyl Violet S4B.

For most purposes,

Brilliant Milling Green B

is also sufficient.

Dyestuffs withstanding the acid milling (dyeings on shapes):

All the dyestuffs withstand the acid milling very well.

The hat bodies must be rinsed very thoroughly after the milling in order to remove the sulphuric acid.

The methods of dyeing are given on pages 280—288.

Dyestuffs for Yellow, Orange,

(On Ladies' and Children's soft Hats,

Yellow and Orange	Pink
Yellow.	For very bright pinks:
For bright yellows:	Rosazeïne B, 13
Naphtol Yellow S	if necessary shaded with
*Acid Yellow AT	Naphtol Yellow S.
*Fast Yellow S.	
For deeper yellows:	For less bright shades of pink:
Indian Yellow G	*Lanafuchsine SG
*Indian Yellow FF, R	*Lanafuchsine SB
*Tropaeoline 0, 00, G.	*Azo Orseille BB
	if necessary shaded with
Orange.	Naphtol Yellow S.
*Orange GG	*Fast Yellow S.
*Orange II, extra, R.	
For very bright oranges.	
Combinations of:	
Naphtol Yellow S	
*Acid Yellow AT	
*Fast Yellow S	
Rosazeïne B, 13.	

All the dyestuffs level very well and for this reason are suited for shading subsequently in the boiling bath.

The colours marked with an asterisk (*) yield dyeings faster to light than those without this distinctive mark.

The methods of dyeing are given on pages 280—288.

Pink and Violet on Hat Felts.

Hat Bodies and Shapes, Wool and Fur Felts.)

Violet	Special properties of fastness
Acid Violet 6BS Formyl Violet S4B, 6B, 8B, 10B shaded if necessary with *Cyanole FF, extra *Tetra Cyanole extra Rosazeïne B, 13. For reddish violets: Acid Violet 4RS *Azo Wool Violet 7R, 4B shaded if necessary with *Cyanole FF, extra *Tetra Cyanole extra Acid Violet 6BS. For subsequent shading in a boiling bath the following come in the first place into consideration: Acid Violet 6BS Azo Wool Violet 7R Rosazeïne B, 13 Cyanole FF, extra Tetra Cyanole extra.	Dyestuffs fast to steaming: All the dyestuffs are exceedingly fast to steaming, with the exception of Acid Violet 4RS which becomes somewhat duller on severe steaming. Dyestuffs which resist acid milling (dyeings on shapes): All the dyestuffs resist acid milling very well. The hat bodies must be rinsed thoroughly after milling in order to remove the sulphuric acid. This is especially necessary in the case of Tropaeoline 00 and G.

The dyestuffs marked with an asterisk (*) yield dyeings faster to light than those without this distinctive mark.

Dyestuffs for Blacks

Blacks of very good fastness to light and ordinary fastness to steaming (for soft fur and wool hat bodies)

For very bluish blacks:

Naphtylamine Black 6B
Hat Black 3BV.

For full blacks with a fine bluish cast:

Naphtylamine Black 4B
Hat Black BB
Hat Black BBV.

For cheap deep blacks:

Naphtylamine Black X2B
Naphtylamine Black X3B
Naphtylamine Black 00.

In addition to Hat Black a very favourite combination for fur hats is that of

Naphtylamine Black 4B and
Naphtol Blue Black

with a little

Indian Yellow G.

Blacks of very good fastness to both light and steaming (for soft fur and wool hat bodies)

For very bluish blacks:

Naphtylamine Black 7BS
Hat Black 5BV, F.

For full blacks with a fine bluish cast:

Hat Black H extra, FC, MC
Naphtylamine Black S, TJ
Naphtylamine Black SGG
(for greenish blacks).

For cheap deep blacks:

Naphtylamine Black SS2B, SS3B, S00.

Hat Black H extra is the principal product for fur hats, Hat Black MC for wool hats.

The other brands of Hat Black and Naphtylamine Black mentioned are used both for fur and wool hats.

For bright-finished hats the following are principally used:

for bluish blacks:

Naphtol Black 6B, 3B
Azo Merino Black 8B, 6B, 6BE

and for deep blacks:

Naphtol Black 2B, B, SG
Azo Merino Black B, BE.

Suitable dyestuffs for shading:

For blacks with a bluish cast:
- Acid Violet 6BS
- Tetra Cyanole V
- Cyanole Green B, 6G
- Brilliant Milling Green B

For jet blacks:
- Indian Yellow G, FF
- Tropaeoline 00, 0
- Orange II, extra
- Naphtol Green B.

The methods of dyeing are given on pages 288—293.

on Hat Felts.

Blacks of very good fastness to light and steaming (for stiff fur and wool hat bodies)	Blacks of very good fastness to light, steaming, alkalies and rinsing (for soft fur and wool hat bodies and such as are stiffened after dyeing)
For bluish blacks: Hat Black 5BV, F Naphtylamine Black 6B.	For blue-blacks: Anthracene Chrome Black 5B.
For full blacks with a fine bluish cast: Hat Black H extra, FC, MC.	For full blacks with a fine bluish cast: Anthracene Chrome Black F Hat Chrome Black B shaded if necessary with Anthracene Chrome Black 5B.
For hats subjected to alkaline rinsing after dyeing: For bluish blacks: Anthracene Chrome Black 5B.	For cheap deep blacks: Anthracene Acid Black DSF, DSFB.
For full blacks with a fine bluish cast: Hat Chrome Black B (especially also for hats with a dull finish) Anthracene Chrome Black F Anthracene Acid Black ST frequently combined with Anthracene Chrome Black 5B.	For cheap blacks, particularly on wool hat bodies: Anthracene Acid Black SR.
For cheap deep blacks: Anthracene Acid Black DSF, DSFB.	Suitable dyestuffs for shading: For blacks with a bluish cast: Formyl Violet S4B Brilliant Milling Blue B Brilliant Milling Green B Anthracene Chrome Blue F, B (for blue-blacks of especially good fastness to light) For jet blacks: Anthracene Yellow BN Brilliant Milling Green B.
For very cheap blacks of minor fastness to light: Naphtyl Blue Black N combined with Logwood, dyed on a mordant of bichrome, bluestone, and oxalic acid.	
Suitable dyestuffs for shading: For acid blacks (Hat Black): Those given in columns 1 and 2. For chrome blacks: Those in column 4.	

The methods of dyeing are given on pages 288—293.

The Dyeing of Loose Wool and Hair for Mixture Felts (Melange Effects).

For dyeing loose wool and hair, the Anthracene Chrome and Anthracene Acid Colours are used in the first place; the particulars respecting the dyeing and the most suitable combinations to use are to be found on pages 107—131 in the chapter on "The Dyeing of loose Wool" and apply equally here.

The dyeings obtained answer any requirements made in the hat industry with respect to fastness and saving of the material; they stand alkaline as well as acid milling perfectly and are exceedingly fast to light, hot pressing, steaming, carbonising, and perspiration.

For Blacks, the brands Anthracene Chrome Black F, FE and P extra in particular have been adopted quite generally. Good effects are also obtained with Naphtylamine Black 635J, especially when dyeing loose hair in an open kettle; the latter brand is dyed in a sulphuric acid bath without any subsequent treatment.

In addition to the Anthracene Colours, some of the Acid Colours of good fastness to milling are used, particularly for the production of bright fancy shades, viz., Milling Yellow, Milling Red, Formyl Violet, Formyl Blue, Brilliant Milling Blue, Alkaline Blue and Brilliant Milling Green, and for Reds also Diamine Fast Red and Diamine Scarlet. These dyestuffs also resist acid milling, more especially in pale and medium dyeings; Milling Yellow and Diamine Fast Red are perfectly satisfactory in this respect even in dark shades.

Loose hair is dyed like loose wool, considerably more dyestuff being however required for hair than for wool.

It is an advantage to dye hair in machines, by which method the material is best preserved and prevented from felting. When dyeing in open kettles, any immoderate handling or boiling should be carefully avoided, because loose hair is considerably more apt to felt than loose wool.

The hair must be well soaked in hot water, before dyeing, in order to remove any traces of mercury mordant.

When chroming Anthracene Colours, the liquor must be cooled off well before adding the bichromate of potash and brought only gradually to the boil again to make the chroming liquor penetrate the material thoroughly.

The Production of Mixture Felts by dyeing ready-milled Hat Bodies.

Mixture felts similar to those produced by mixing material dyed in the loose state may be obtained by dyeing milled hat bodies.

In such cases the undyed wool is mixed with white vegetable fibres (China-grass, cotton, etc.), milled in the usual manner, and dyed in the form of bodies with dyestuffs which leave the vegetable fibres undyed.

The dyestuffs best suited for this article are:

Fast Yellow S	Azo Wool Violet 7R, 4B
Acid Yellow AT	Cyanole, all brands
Naphtol Yellow S	Tetra Cyanole, all brands
Orange GG	Brilliant Milling Blue B
Azo Orseille BB, BE	Indigo Blue N, SGN
Lanafuchsine 6B	Blue PC (No 9623)
Acid Magenta	Azo Wool Blue SE
Brilliant Scarlet, all brands	Azo Navy Blue B, 3B
Crystal Scarlet 6R	Acid Navy Blue A
Scarlet FR, F2R, F3R	Azo Merino Blue G, 3B
Naphtol Red C, EB	Cyanole Green B, 6G
Amaranth	Cyanole Fast Green G
Azo Red A	Fast Acid Green BN, B
Azo Rubine A	Acid Green, all brands
Acid Violet 6BS, 4RS	Naphtylamine Black EFF } for black.
Formyl Violet, all brands	Naphtylamine Black S } for black.

The dyeing is carried out as detailed on pages 280—282 and 288. In order to obtain as clear effects as possible, care must be taken to exhaust the dyebaths well. The goods must be very well rinsed after dyeing in order to remove the sulphuric acid.

Note: For coloured effects, either vegetable fibres may be used which have been previously dyed fast to acids, or the fibres are dyed with suitable Diamine Colours in a fresh, cold bath, after dyeing the hats with Acid Colours.

Print and Discharge Effects on Hat Felts.

a) Producing effects by the application of print paste.

The method is as follows:

The bodies dyed to any given shade are painted with a darker print paste, dried, steamed, and washed.

On the parts which have been painted in this manner, dark patterns or mixture effects are obtained on a lighter ground. In a like manner the same mixture effects may be obtained on both sides of the hats by applying the print paste accordingly.

The effects may also be varied for instance by painting the two sides with print pastes of different colours, or only one side of the body, dyed previously any given shade, uniformly with a darker print paste and after drying brushing one or both sides with a different print colour.

b) Producing discharge effects by discharging with Hyraldite W.

For the production of white or light-coloured effects on a darker ground, Hyraldite discharges are resorted to, which are brushed on the goods and to which dyestuffs suitable for producing coloured discharge effects may be added according to requirement.

The following dyestuffs, which are easily dischargeable with Hyraldite, may be used for dyeing the bodies:

Acid Yellow AT	Naphtol Red C
Fast Yellow S	Acid Violet 4RS
Orange extra, II, R, GG	Cyanole FF, extra (for pale blue)
Lanafuchsine SG	Azo Wool Blue C
Scarlet FR, F2R, F3R	Naphtylamine Black EFF.
Brilliant Scarlet GG—3R	

Dye according to the method customary for Acid Colours with the addition of Glauber's salt and subsequently of sulphuric acid as described on page 280.

Particulars for printing and discharging will be found in the next chapter.

Wool Printing.

(Printing of Piece-Goods, Slubbing and Yarns, and Discharge Printing.)

Our

Anthracene Chrome Black, patented,

bears further the abbreviated name of

"Crown Black"

and is also under this denomination very well known to the trade.

The different brands may be referred to equally well as:

Crown Black F	or	Anthracene Chrome Black F
Crown Black FE	or	Anthracene Chrome Black FE
Crown Black 5B	or	Anthracene Chrome Black 5B
Crown Black P extra	or	Anthracene Chrome Black P extra
Crown Black PR extra	or	Anthracene Chrome Black PR extra
Crown Black PF extra	or	Anthracene Chrome Black PF extra.

Wool Printing.

(Printing of Piece-Goods, Slubbing and Yarns, and Discharge Printing.)

Printing of Piece-Goods.

Pieces to be printed are first washed (usually in a small broad-washing-machine) with soap and soda at a temperature of about 45° C. (115 deg. F.), then well rinsed, and thereupon bleached immediately.

Bleaching the Goods.

The goods are either bleached in the ordinary manner by stoving in the sulphur stove, or, more commonly now-a-days, by a treatment with sodium bisulphite.

The pieces are passed through a cold bath containing 10—15 gallons bisulphite of 62° Tw. per 100 gallons water, squeezed off well, and left either batched or cuddled for about 24 hours. They are then rinsed, acidulated with acetic acid, and washed.

Weaker bisulphite baths are sometimes used, in which cases the goods are acidulated after a short while, the operation being then repeated several times.

Fabrics intended to show print effects on a white bottom are in some cases taken through a peroxide of hydrogen bath subsequent to the stoving; the bath should contain about 1—1½ gallon peroxide of hydrogen per 100 gallons water.

The Chloring

subsequent to the bleaching, whereby the affinity of the wool for the colouring matters is increased, is carried out in various ways.

The best way is to chlorinate the goods at their full width, using either wooden jiggers or dye-vats, through which the goods pass full-width. The goods should be for a very short time only in contact with the mixture of chloride of lime and acid and then be rinsed immediately in a vat or a second jigger in which the water is being continually renewed. Goods

which are intended to show a white bottom are chlored more gently then those with a dark bottom.

The proportions of chloride of lime and acid are about the following:

For light bottoms:

400 gallons water
20 „ chloride of lime solution of 6° Tw.
8 „ sulphuric acid of 20° Tw.

For dark bottoms:

400 gallons water
30 „ chloride of lime solution of 6° Tw.
12 „ sulphuric acid of 20° Tw.

Whilst the goods pass through the bath, chloride of lime and acid are allowed to run in by two separate funnels, weak solutions being used in the case of white bottomed goods and solutions of about double the strength for dark bottomed goods.

Chloride of lime solution: { 50 gallons water; 10 „ chloride of lime of 6° Tw.

Acid solution: { 50 „ water; 5 „ sulphuric acid of 20° Tw.

Chloride of soda may be used in place of chloride of lime, the former often being preferred for this purpose.

Sulphuric acid is to be preferred to hydrochloric acid, because in using the latter the goods are apt to assume a yellowish tint on steaming.

The chlorine vapours which form during the preparing should be drawn off by means of a ventilator or a hood.

The more severely the goods are chlored, the better the dyestuffs will be absorbed by the wool, but the operation must not be carried to excess, as the wool will then turn yellow and harsh. The goods must also be very thoroughly rinsed after chloring.

For chloring wool, Kwayser's chloring machine which admits of continual working has proved excellently serviceable in practice. Its principal features are a wooden box provided

with windows, and containing two stone troughs inside, with several guiding rollers. The chlorine gas evolved during the operation is drawn off by means of an exhauster. In the first trough which is connected with two receivers placed outside the machine, the solutions of sulphuric acid and chloride of soda are mixed together; the second trough contains the rinsing water. The two receivers are made of earthenware or cement, one containing about 200 gallons solution of chloride of soda of 7° Tw. in 500 gallons water, and the other about 16 gallons sulphuric acid of 168° Tw. in 500 gallons water. Above the troughs are fixed two pairs of nippers, one pressing off the chloride solution, and the other removing the surplus wash water which is sprayed on to the material by means of sprinklers. The goods pass in and out through narrow slits in the wooden walls.

Tin Preparation.

In some instances, particularly for Eosines and Rosazeïnes, the wool is prepared with tin as follows:

The goods are padded with a solution of stannate of soda of 4—7° Tw., batched for one hour, passed through a sulphuric acid bath of 1½° Tw., and then rinsed and dried.

Print Colours.

The preparation of the print colours is comparatively simple; of main importance is the use of a good thickening agent. Very well adapted for this purpose are the various preparations of insoluble gums, such as crystal gum, gomme Labiche, etc.; besides these, British gum, tragacanth, wheat starch and pulverised gum arabic are principally used.

The following substances are added as fixing agents to the print colours:

a) With Acid Colours:

Sulphuric acid,	Tartaric acid or
Oxalic acid,	Acetic acid.

Sulphuric acid has the best fixing effect, but presents the disadvantage that in roller-printing the cotton back cloths are affected too much by its action. Although this may be prevented to some extent by treating the latter with soda or silicate of soda, sulphuric acid is used for roller-printing in exceptional cases only, chiefly for very dark bottoms.

The next best result is obtained with oxalic acid, which is the most extensively employed for wool printing, 1—5 oz per gallon of print colour being required.

Tartaric acid is similar to, but rather weaker in its effect than, oxalic acid, and is also used frequently.

Acetic acid has not nearly the same fixing effect as the above-named acids; it is used especially for Basic Colours and Eosines.

Other additions are:

Chlorate of soda. This product is especially to be recommended for dark shades and is to prevent the dyestuff from being reduced by very moist steam; it is particularly useful in the case of black dyestuffs (1 – 3 oz per gallon of print colour).

Glycerine was formerly used in almost any print colour (3—6 oz per gallon of print colour) in order to increase the hygroscopic property of the prints on the fibre, but an even moistening not being attainable by this method, print colours are now usually prepared without the addition of glycerine.

Alum and acetate of alumina are added to certain dyestuffs, especially with the Scarlets and Naphtol Blacks, in order to fix the dyestuff more readily.

Tin crystals are added in very small quantities (at most $2^1/_2$—3 oz per gallon of print colour) with the Eosines and Rosazeïnes, as they give the shades a somewhat brighter and yellower appearance.

Acetate of soda, tungstate of soda or phosphate of soda (about $1^1/_2$ oz per gallon of print colour) are added to print colours which are used for block printing or as ground colours, these additions effecting a better levelling of the colours.

b) Basic Colours

are printed with the addition of acetic acid of 8° Tw. (8—12 oz per gallon of print colour); in a few instances some tartaric acid ($2^1/_2$—3 oz per gallon of print colour) is added besides the acetic acid.

Other additions are:

Acetate of soda, tungstate of soda or phosphate of soda (about $1^1/_2$ oz per gallon of print colour) in order to increase the levelling of the dyestuff.

c) Diamine Colours.

As compared with Acid Colours, the dyestuffs of this group offer various advantages, especially with respect to the production of prints fast to washing and water. They are usually printed with the addition of phosphate of soda ($1^1/_2$—3 oz per gallon of print colour); acetic acid, acetate of ammonia or oxalate of ammonia are sometimes employed instead.

d) Anthracene Acid and Anthracene Chrome Colours.

Some of these dyestuffs may be dyed with the addition of oxalate of ammonia without any chrome, whereas in the case of others an addition to the print colour of chromium fluoride, acetate of chrome or simply chromate of potash (yellow chromate of potassium) is essential.

Printing, Steaming, and Washing the Goods.

The printing is carried out in the customary manner. It is of especial importance that the engravings be not too shallow, and care should be taken to have a very soft blanket. The goods should be dried at a moderate temperature, so that they leave the drying-room only lightly dried.

For the purpose of steaming, the goods are rolled up with lightly damped cloths and are either steamed along with these, or unrolled again after lying for some time and steamed without back cloths.

The degree of moisture of the goods during the steaming is of the greatest importance for the satisfactory fixing of the dyestuffs; if the goods are not properly moistened, the fixing is imperfect, and on the other hand the printed patterns may suffer in clearness of outline by exceeding the right degree of moisture.

The goods are usually steamed for one hour without any pressure, then washed (best in running water), and dried.

Warm water must not be used for washing, as the white might easily be tinted thereby. Some salt or Glauber's salt is frequently added to the first wash water.

Dyestuffs principally used for Wool Printing.

Any of the dyestuffs mentioned in the general part of this book may be used for wool printing. Below are given the dyestuffs which have proved the best suited for this purpose.

For Yellow:

Milling Yellow 0
Acid Yellow AT
Anthracene Yellow C paste

Milling Yellow 0 and Anthracene Yellow C paste possess the advantage of not bleeding on steaming or washing; their prints are also very fast to washing and to water. Acid Yellow AT serves mainly as a yellowing agent for pale compound shades, Milling Yellow 0 being preferred for darker shades.

Thioflavine S
Diamine Yellow CP
Diamine Fast Yellow A, FF

are used principally for prints of very good fastness to washing and water.

Thioflavine T
New Phosphine G
Isertal Yellow 811

Thioflavine T is used for very bright lemon-yellow effects, whilst New Phosphine G and Isertal Yellow 811 come into consideration more for dull yellows and old gold shades; the latter are used particularly also for hand-printed styles.

Printing Directions.

For Milling Yellow 0 and Acid Yellow AT:

5 — 40 parts by weight of dyestuff are dissolved in
435 — 390 „ „ „ „ hot water and boiled with
200 „ „ „ „ crystal gum 1:2 and
200 „ „ „ „ British gum.

When cold,

10 — 20 parts by weight of oxalic acid dissolved in
150 „ „ „ „ hot water, are added.
1000 parts.

For Anthracene Yellow C paste:

20 — 100 parts by weight of Anthracene Yellow C paste are dissolved in
405 — 300 „ „ „ „ hot water and boiled with
200 „ „ „ „ crystal gum 1:2 and
200 „ „ „ „ British gum.

When cold,

25 — 50 parts by weight of oxalate of ammonia dissolved in
150 „ „ „ „ hot water, are added.
1000 parts.

For Thioflavine S, Diamine Yellow CP and Diamine Fast Yellow A, FF:

5 - 40 parts by weight of dyestuff are dissolved in
590 — 540 „ „ „ „ boiling water and boiled with
200 „ „ „ „ crystal gum 1:2,
200 „ „ „ „ British gum and
5 - 20 „ „ „ „ phosphate of soda.
1000 parts.

For Thioflavine T, New Phosphine G and Isertal Yellow 811:

2 — 30 parts by weight of dyestuff are dissolved with
568 — 470 „ „ „ „ hot water, and then mixed with
200 „ „ „ „ crystal gum 1:2,
200 „ „ „ „ tragacanth solution 60:1000 and
30 — 100 „ „ „ „ acetic acid of 8° Tw.
1000 parts.

For Orange:

Orange GG
Orange II, extra

Orange GG is the most important of the orange Acid Colours, because it is less apt to run than the other brands of Orange; all the orange Acid Colours, however, should be printed with a good deal of acid in order to ensure the production of a good white.
These dyestuffs may be used in combination with any others.

Diamine Orange F

The prints obtained with Diamine Orange F are fast to water and washing.

Printing Directions.

For Orange GG, II, extra:

5 — 30 parts by weight of dyestuff are dissolved in
385 — 340 „ „ „ „ hot water and boiled with
200 „ „ „ „ crystal gum 1:2 and
200 „ „ „ „ British gum.

When cold,

10 — 30 parts by weight of oxalic acid dissolved in
200 „ „ „ „ hot water are added.
1000 parts.

For Diamine Orange F: Same as for Thioflavine S (page 321).

For very bright Pinks and Reds:

Rosazeïne B
Eosine 3G, GGF
Eosine Scarlet B
Erythrosine yellow shade
Phloxine 749
Rose Bengale extra N
Irisamine G

These dyestuffs are all used for producing very lively and brilliant effects.

For roller-printing and for mixed shades Rosazeïne is given the preference, but for block-printing the Eosine Colours are used quite generally.

Printing Directions.

For Rosazeïne B: Same as for Milling Yellow 0 (page 321).

For Eosines:

3 — 20 parts by weight of dyestuff are dissolved in
577 — 530 „ „ „ „ hot water and boiled with
200 „ „ „ „ crystal gum 1:2 and
200 „ „ „ „ tragacanth solution 60:1000.

When cold,

20 — 50 parts by weight of acetic acid of 8° Tw. are added.
1000 parts.

For Scarlet shades:

Scarlet FR, F2R, F3R
Brilliant Cochineal 2R, 4R
Crystal Scarlet 6R

These dyestuffs are used very largely both for roller- and block-printing.

Diamine Scarlet B, 3B
Diamine Purpurine B, 3B, 6B
Milling Red G

are used especially for prints requiring very good fastness to washing and water.

Printing Directions.

For Scarlet, Brilliant Cochineal and Crystal Scarlet:

5— 40 parts by weight of dyestuff are dissolved in
415—350 „ „ „ „ hot water and boiled with
200 „ „ „ „ crystal gum 1:2 and
200 „ „ „ „ British gum.

When cold,

10— 20 parts by weight of oxalic acid dissolved in
150 „ „ „ „ hot water and
20— 40 „ „ „ „ acetate of alumina of 23° Tw. are added
1000 parts.

For Diamine Scarlet and Diamine Purpurine:

Same as for Thioflavine S (page 321).

For Milling Red G:

Same as for Milling Yellow 0 (page 321).

For deep Reds and Clarets:

Azo Rubine A
Amaranth
Naphtol Red C, EB
Lanafuchsine SG, SB, 6B
Azo Red A
Azo Orseille BB

Azo Rubine, Amaranth and Naphtol Red are the dyestuffs most extensively used both in roller- and block-printing. For reddish brown shades they are used as reddening agents, whilst for lighter compound shades the Lanafuchsines and Azo Orseille are more suitable reddening agents.

Printing Directions: Same as for Milling Yellow 0 (page 321).

Milling Red FR
Wool Red B, BG
Diamine Fast Red F
Diamine Bordeaux S, B
Diamine Rose, all brands

are used for red and claret-coloured prints of good fastness to washing and water.

Printing Directions.

For Milling Red FR, and Wool Red B and BG:

Same as for Milling Yellow 0 (page 321).

For Diamine Fast Red F, Diamine Bordeaux S and B, and Diamine Rose, all brands:

Same as for Thioflavine S (page 321).

For Violet shades:

Formyl Violet, all brands
Azo Wool Violet 4B, 7R
Acid Violet 6BS

The Formyl Violets are the brands most extensively used for wool printing, as they do not run on steaming and yield prints of very good fastness to washing and water. Acid Violet 6BS and Azo Wool Violet 4B are used both as self colours and in mixtures; Azo Wool Violet 4B in particular is used very largely for printing navies, shaded according to requirement with Cyanole or Brilliant Milling Green.

Printing Directions:

Same as for Milling Yellow O (page 321).

For very bright Blues:

Cyanole extra, FF
Tetra Cyanole V, SF, extra
Alkaline Blue 6B, 3R
Water Blue B, RB, R
Brilliant Milling Blue B

The Cyanoles and Tetra Cyanoles are very largely used partly for producing very pale and bright blues and also as blueing agents in various compound shades, the Alkaline Blues and Water Blues on the other hand serving only for deeper, bright blues.

Brilliant Milling Blue B yields prints of very good fastness to washing and water and may in numerous cases be used as a substitute for Victoria Blue, as compared with which it has the advantage that the colours do not run and are exceedingly fast to rubbing.

Printing Directions: Same as for Milling Yellow O (page 321).

For Blues and Navies:

Formyl Blue B
Indigo Blue SGN
Solid Blue BD, BBD, BRD, 3RD

With very few exceptions navies and dark blues were formerly printed with the various Solid Blues (Induline), which are still used to a good extent for this purpose. They have all however the disadvantage of not yielding perfectly level prints. On this account combinations of Formyl Violet and Formyl Blue with Brilliant Milling Green are now preferred for these shades, as they give even shades of very good fastness to water and washing. Combinations of Azo Wool Violet 4B and Brilliant Milling Green are also frequently used. Indigo Blue SGN is likewise well suited for the production of such shades.

Diamine Blue 2B, 3B
Diamine Sky Blue

These dyestuffs are used for producing prints possessing good fastness to washing and water.

Anthracene Chrome Blue F, G
Anthracene Chrome Blue BB

The Anthracene Chrome Blues are used particularly for dyeing dark blue shades of very good fastness to light on gentlemen's suitings.

Printing Directions.

a) For Solid Blue BD, BBD, BRD, 3RD:

30 — 40 parts by weight of Solid Blue are dissolved in
380 — 370 „ „ „ „ hot water and boiled with
200 „ „ „ „ crystal gum 1:2 and
200 „ „ „ „ British gum.

When cold,

30 parts by weight of oxalate of ammonia and
10 „ „ „ „ oxalic acid dissolved in
150 „ „ „ „ hot water, are added.
1000 parts.

b) For blues and navies fast to washing composed of Formyl Violet or Formyl Blue and Brilliant Milling Green B:

25– 40 parts by weight of Formyl Violet S4B or Formyl Blue B and
10– 20 „ „ „ „ Brilliant Milling Green B are dissolved in
515–490 „ „ „ „ hot water and boiled with
280 „ „ „ „ British gum.

When cold,

20 parts by weight of oxalic acid dissolved in
150 „ „ „ „ hot water, are added.
1000 parts.

c) For blues and navies composed of Azo Wool Violet and Brilliant Milling Green:

20– 30 parts by weight of Azo Wool Violet 4B and
10– 15 „ „ „ „ Brilliant Milling Green B are dissolved in
520–505 „ „ „ „ hot water and boiled with
280 „ „ „ „ British gum.

When cold,

20 parts by weight of oxalic acid dissolved in
150 „ „ „ „ hot water, are added.
1000 parts.

d) For Indigo Blue SGN:

Same as for Milling Yellow 0 (page 321).

e) For Diamine Blue and Diamine Sky Blue:

Same as for Thioflavine S (page 321).

f) For Anthracene Chrome Blue:

20– 40 parts by weight of dyestuff and
3 „ „ „ „ sulphocyanide of ammonia are dissolved in
492–437 „ „ „ „ hot water and boiled with
300 „ „ „ „ British gum and
15– 30 „ „ „ „ oxalate of ammonia.

When cold,

20– 40 parts by weight of chromium fluoride dissolved in
150 „ „ „ „ hot water, are added.
1000 parts.

For Green and Olive shades:

Acid Green extra conc.
Acid Green extra conc. B
Cyanole Green B, 6G
Cyanole Fast Green G
Brilliant Milling Green B

} In addition to the various brands of Acid Green and Cyanole Green, which are used very largely both alone and for mixtures, Cyanole Fast Green and Brilliant Milling Green deserve special mention, as they are employed in exceedingly large quantities for wool printing; more particularly the latter is used a great deal in mixtures with the violet dyestuffs for green, olive and blue shades, as it yields prints of very good fastness to washing and water and is easily fixed without running.

Naphtol Green B } This is used in cases where quite exceptional requirements are made with respect to fastness to light.

Diamine Green B, G
Diamine Dark Green N } yield prints of very good fastness to washing and water.

Printing Directions.

For Acid Green, Cyanole Green, Cyanole Fast Green and Brilliant Milling Green:

Same as for Milling Yellow 0 (page 321).

For Naphtol Green:

30 – 60 parts by weight of Naphtol Green B are dissolved in
460 – 400 „ „ „ „ hot water, and boiled with
200 „ „ „ „ crystal gum 1 : 2 and
200 „ „ „ „ British gum.

When cold,

20 – 30 parts by weight of chlorate of soda dissolved in
60 „ „ „ „ water, and
30 – 50 „ „ „ „ acetic acid of 8° Tw., are added.
1000 parts.

For Diamine Green and Diamine Dark Green:

Same as for Thioflavine S (page 321).

For Brown shades:

The results obtained with the various brands of Acid Brown in wool printing are not very satisfactory, and combinations of yellow, red and green are therefore preferred in most cases for the production of brown shades.

Very satisfactory results are obtained with combinations of:

Milling Yellow 0,
Lanafuchsine 6B
Brilliant Milling Green B.

Printing Directions.

30 parts by weight of Milling Yellow 0,
9 „ „ „ „ Lanafuchsine 6B and
1 – 2 „ „ „ „ Brilliant Milling Green B are dissolved in
390 „ „ „ „ hot water and boiled with
200 „ „ „ „ crystal gum 1 : 2 and
200 „ „ „ „ British gum.

When cold,

20 parts by weight of oxalic acid dissolved in
150 „ „ „ „ hot water are added.
1000 parts.

The following are also used to a very large extent for wool printing:

Diamine Brown 3G, R
Diamine Brown B, M
Diamine Catechine G

These dyestuffs yield prints of very good fastness to washing and water.

Printing Directions.

Same as for Thioflavine S (page 321).

Anthracene Chrome Brown D, DW
Anthracene Acid Brown G, R, N, B, V

The Anthracene Chrome Brown brands are always printed with chrome; the various brands of Anthracene Acid Brown may be printed without chrome also and behave then like the ordinary Acid Colours. When fixed with chrome the colours yield prints of very good fastness to washing and light.

Printing Directions.

For Anthracene Acid Brown without chrome:

20 – 40 parts by weight of dyestuff are dissolved in
585 – 540 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

25 – 50 parts by weight of oxalate of ammonia dissolved in
120 „ „ „ „ hot water, are added.
1000 parts.

For Anthracene Acid and Anthracene Chrome Brown with chrome:

20 – 40 parts by weight of dyestuff are dissolved in
550 – 500 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

15 – 30 parts by weight of chromium fluoride and
15 – 30 „ „ „ „ oxalate of ammonia dissolved in
150 „ „ „ „ hot water, are added.
1000 parts.

In block-printing, Aniline Yellow and New Phosphine mixed with Methyl Violet are also used very frequently for brown shades, according to the directions given for New Phosphine on page 321.

For Grey and Mode shades:

Grey shades:

Aniline Grey
Silver Grey
Nigrosine soluble in water
Induline

} According to the tone required, any of these products may be used for the production of grey and greyish blue shades. They may be shaded at will with Cyanole, Acid Violet or Acid Green.

Printing Directions.

5– 20 parts by weight of dyestuff are dissolved in
625–600 „ „ „ „ hot water and boiled with
300 „ „ „ „ British gum and
20 „ „ „ „ glycerine.

When cold,

10– 20 parts by weight of tartaric acid dissolved in
40 „ „ „ „ hot water, are added.
1000 parts.

It is well to add some alcohol to the ready print colour in order to enhance its levelling property.

Very good shades of grey may also be obtained with combinations of:

Tetra Cyanole V
Lanafuchsine SG
Milling Yellow 0

which may likewise be used for any kind of mode shades.

Printing Directions.

For pale grey:		For light mode brown:		For mignonette:	
6 parts	Tetra Cyanole V	2 parts		4 parts	
9 „	Lanafuchsine SG	8 „		2 „	
5 „	Milling Yellow 0	20 „		14 „	
	are dissolved in				
4280 parts	hot water and boiled with	4270 parts		4280 parts	
2000 „	crystal gum 1 : 2 and	2000 „		2000 „	
2000 „	British gum.	2000 „		2000 „	
	When cold,				
200 parts	oxalic acid dissolved in	200 parts		200 parts	
1500 „	hot water are added.	1500 „		1500 „	
10000 parts.		10000 parts.		10000 parts.	

For Black:

Naphtol Black BDF
Naphtol Black BG conc.
Naphtol Black BGN conc.

Naphtol Black BDF is the dyestuff mostly used for black printing. It yields a very fine shade of blue-black and blues the white very slightly in washing, as is frequently desired.

Naphtol Black BGN conc. is a little more easily fixed than BDF, and yields cleaner waste waters.

The waste waters of Naphtol Black BG conc. are perfectly clear; this product may also be printed on wool which has not been chlorinated

Vigoureux Black S
Anthracite Black EG

These two products serve chiefly for black prints on gentlemen's suitings and are used in large quantities to imitate the so-called Vigoureux style; they are distinguished for very good fastness to washing and light.

Naphtylamine Black 4B, D

These are used especially for printing woollen cloth with silk effects.

Printing Directions.

For Naphtol Black BDF:

60– 70 parts by weight of Napthol Black BDF and
5 „ „ „ „ Brilliant Milling Green B are dissolved in
405–395 „ „ „ „ hot water and boiled with
280 „ „ „ „ British gum.

When cold,

15 parts by weight of chlorate of soda dissolved in
25 „ „ „ „ hot water, and
15 „ „ „ „ alum and
20 „ „ „ „ oxalic acid dissolved in
175 „ „ „ „ hot water, are added
1000 parts.

For Naphtol Black BG conc. and BGN conc.:

45– 65 parts by weight of Naphtol Black BG conc. or BGN conc. are dissolved in
425–405 „ „ „ „ hot water and boiled with
280 „ „ „ „ British gum.

When cold,

15 parts by weight of chlorate of soda dissolved in
25 „ „ „ „ hot water, and
15 „ „ „ „ alum and
20 „ „ „ „ oxalic acid dissolved in
175 „ „ „ „ hot water, are added.
1000 parts.

For Vigoureux Black S:

60 – 80 parts by weight of Vigoureux Black S and
3 „ „ „ „ sulphocyanide of ammonia are dissolved in
362 – 332 „ „ „ „ hot water and boiled with
280 „ „ „ „ British gum.

When cold,

40 – 50 parts by weight of chromium fluoride,
5 „ „ „ „ chlorate of soda and
50 „ „ „ „ oxalate of ammonia dissolved in
200 „ „ „ „ hot water, are added.
1000 parts.

For Anthracite Black EG:

50 – 70 parts by weight of Anthracite Black EG are dissolved in
420 – 400 „ „ „ „ hot water and boiled with
280 „ „ „ „ British gum.

When cold,

15 parts by weight of chlorate of soda dissolved in
25 „ „ „ „ hot water, and
15 „ „ „ „ alum and
20 „ „ „ „ oxalic acid dissolved in
175 „ „ „ „ hot water, are added.
1000 parts.

For Naphtylamine Black 4B, D:

75 parts by weight of Naphtylamine Black 4B,
30 „ „ „ „ Naphtylamine Black D,
1½ „ „ „ „ Acid Green extra conc. and
4 „ „ „ „ Milling Yellow 0 are dissolved in
260 „ „ „ „ hot water, and boiled with
240 „ „ „ „ gum solution 1:1, and
169 „ „ „ „ white dextrine.

When cold,

18 parts by weight of chlorate of soda dissolved in
25 „ „ „ „ hot water, and
18 „ „ „ „ alum and
10 „ „ „ „ oxalic acid dissolved in
150 „ „ „ „ hot water, are added.
1000 parts.

The Printing of Slubbing (Vigoureux Printing).

Slubbing is only very rarely submitted to any preparation previous to printing. Although many dyestuffs yield fuller and faster dyeings on chlored slubbing than on unchlored goods, a previous treatment is as a rule omitted in order to limit as much as possible the number of operations and thus save the material.

1. Printing.

The printing is carried out in the so-called Vigoureux- and gill-box machine, the thickened colour being printed on the well-opened, flat slubbing by means of specially grooved rollers so as to penetrate the material evenly.

The grooving of the rollers depends on the proportion of white or coloured ground required and the colour to be printed; if, for instance, equal proportions of white and coloured parts are wanted, the deep and the raised parts of the printing rollers should be of the same width, and, should a proportion be wanted of 9 parts white to 1 part of colour, the deep parts of the roller should be 9 times as wide as the raised portions.

The print colours are produced by dissolving the dyestuff in a small quantity of boiling water, boiling up again with the thickening, and, when cool enough, mixing with the other well dissolved additions, then stirring until cold.

Certain dyestuffs which are sensitive to copper are best dissolved with the addition of a little sulphocyanide of ammonia.

The print colours used for printing slubbing should not be too thick. Such thickening agents should be given the preference which are easily removed from the fibre by washing. British gum and more recently also Sennar gum (Vigoureux gum) are largely used for this purpose, in addition to which gum tragacanth, dextrine and starch also come into consideration.

As fixing agent for chrome colours, chromium fluoride has been found especially useful, and formate of chrome more particularly for Anthracene Chrome Black 5B and P extra and for Anthracene Chrome Blue and Vigoureux Black. Acetate of chrome, however, and in some cases chromate of potash (yellow chromate of potash) also prove very serviceable. When using the latter, the shade obtained is generally somewhat yellower and fuller.

2. Steaming.

Steaming is one of the most important operations in the printing of slubbing, the fastness of the print being to a large extent dependent thereon. The slubbing is not dried after printing, as is the case in printing woollen piece-goods, but is immediately steamed with moist steam. If the slubbing cannot be steamed immediately after printing, it is piled up in heaps and covered with damp cloths to prevent its becoming dry.

It is customary to steam without any pressure in a wooden or iron box arranged as follows:

At the bottom of the box is inserted a copper steam-pipe running in at least three coils and provided on either side with holes through which the steam is blown into the box. Over the steam-coil is fixed a false bottom consisting of wooden laths covered with coarse canvas to prevent the goods from being spotted by drops of condensed water. The steam-box is closed on the top by means of a strong cover which can be easily removed, this cover generally consisting of two parts; the latter is kept in position during the steaming by means of weights, but is not intended to be steam-tight.

Anthracene and Vigoureux Colours are to advantage steamed with only slight pressure (abt. 4 lbs to the square inch), the fixing being thus more rapidly and satisfactorily effected. The well-known steam-boxes (autoclaves) are used as steamers.

The printed slubbing while still damp is packed into wire baskets or nets, put into or hung up in the steamer, and steamed in this manner. Direct steam is blown in for $1-1^1/_2$ hour and then shut off; the slubbing is then allowed to cool in the air and steamed for another $^3/_4$ to $1^1/_2$ hour according to requirement.

Chrome Colours require a longer steaming, in order to fix them completely, than is necessary for Acid or Diamine Colours.

The goods are taken out after steaming and spread out, if convenient, in order to cool them.

3. Washing.

Pale shades, that is to say, shades produced by printing very narrow stripes which lie far apart from each other, may be washed immediately after steaming. Dark shades such as are obtained with rollers with 50% grooving are however best allowed to lie for some time before steaming, because the colours gain considerably in depth by lying for a few hours.

The washing machine ("back-wash") usually consists of five compartments. The two first contain pure water; the third contains water with an addition of 1½ oz soda ash per 10 gallons liquor, the fourth and fifth soap water containing 1½—3 oz soap per 10 gallons. Both the water and the soda and soap solutions are continually replenished, so that the baths are kept constantly fresh and quite full. The baths are all heated to about 40—50° C. (105—120 deg. F.)

On leaving each of the several compartments, the slubbing is passed through a pair a squeezing rollers covered with cloth, then over drying drums through the gill-box, and finally rolled up. The slubbing is combed 2—3 times according to requirement.

Dyestuffs for the Printing of Slubbing.

The selection of the dyestuffs depends on the use to which the printed slubbing is put.

Very good fastness to milling, in addition to good fastness to light, being usually required for gentlemen's suitings, the Anthracene Colours and Vigoureux Colours usually come into consideration in the first place for this class of goods; for ladies' dress materials, on the other hand, Acid Colours and Diamine Colours are chiefly used.

The slubbing is usually printed in its original white condition; for a few special shades only it is in some isolated cases vat-dyed before printing.

A. Dyestuffs for Vigoureux Printing intended for Gentlemen's Suitings.

The following dyestuffs come into consideration in the first place:

For Yellow:

Anthracene Yellow C paste
Anthracene Yellow BN
Anthracene Yellow GG

Anthracene Yellow C and GG are the principal brands for the production of yellow shades, the latter being especially used for greenish yellows. For compound shades Anthracene Yellow BN particularly is used to a large extent.

Milling Yellow 0
Diamine Fast Yellow FF, A
Diamine Yellow CP

Milling Yellow 0, Diamine Yellow CP, and Diamine Fast Yellow FF and A are printed without the addition of chromic salts; on account of their bright shades they are principally used for producing bright yellow effect colours. Their prints are exceedingly fast to light; in fastness to washing and milling they are not quite equal to Anthracene Yellow, but satisfactory for most purposes.

Printing Directions.

For Anthracene Yellow C paste:

25–100 parts by weight of Anthracene Yellow C paste are dissolved in
530–425 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

5– 20 parts by weight of chromium fluoride and
15– 30 „ „ „ „ oxalate of ammonia dissolved in
175 „ „ „ „ hot water, are added.
1000 parts.

For Anthracene Yellow BN:

10– 40 parts by weight of Anthracene Yellow BN are dissolved in
545–485 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

5– 20 parts by weight of chromium fluoride and
15– 30 „ „ „ „ oxalate of ammonia dissolved in
175 „ „ „ „ hot water, are added.
1000 parts.

For Anthracene Yellow GG:

The print colour is prepared same as for Anthracene Yellow BN with the only difference that equal quantities of chromium fluoride and dyestuff are added.

For Milling Yellow 0:

10— 40 parts by weight of Milling Yellow 0 are dissolved in
580—540 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

10— 20 parts by weight of oxalic acid dissolved in
150 „ „ „ „ hot water are added.
1000 parts.

For Diamine Fast Yellow FF and A, and Diamine Yellow CP:

5— 40 parts by weight of dyestuff are dissolved in
640—590 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum and
5— 20 „ „ „ „ phosphate of soda dissolved in
100 „ „ „ „ hot water.
1000 parts.

For Orange:

Combinations of

Diamine Fast Yellow FF
Diamine Yellow CP
Diamine Scarlet B

} Printing directions same as for Diamine Fast Yellow FF (see above).

Still faster to milling are combinations of

Anthracene Yellow BN
Diamine Fast Red F

} Printing directions same as for Anthracene Yellow BN (page 334).

For Brown:

Anthracene Acid Brown G
Vigoureux Brown N
Vigoureux Brown B
Vigoureux Brown SW
Vigoureux Brown V
Anthracene Chrome Brown D
Anthracene Chrome Brown DW

} These dyestuffs are used both alone and in combination with one another and render it possible to obtain any given shade of mode brown. Very red browns and prune tones are shaded with Vigoureux Red A and Anthracene Chrome Violet B. Anthracene Acid Brown G and Vigoureux Brown N yield bright yellowish browns. Vigoureux Brown V reddish shades of brown, and B and SW full browns with a yellowish cast. Anthracene Chrome Brown D and DW are especially well adapted for dark browns.

Printing Directions.

For Anthracene Acid Brown G and Vigoureux Brown N, B, SW, V:

20 — 50 parts by weight of dyestuff are dissolved in
495 — 435 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

15 — 30 parts by weight of chromium fluoride,
15 — 30 „ „ „ „ oxalate of ammonia and
5 „ „ „ „ chlorate of soda dissolved in
200 „ „ „ „ hot water, are added.
1000 parts.

For Anthracene Chrome Brown D and DW:

20 — 50 parts by weight of dyestuff are dissolved in
470 — 400 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

25 — 50 parts by weight of chromium fluoride,
15 — 30 „ „ „ „ oxalate of ammonia and
5 „ „ „ „ chlorate of soda dissolved in
215 „ „ „ „ hot water, are added.
1000 parts.

Anthracene Chrome Brown D is also to advantage printed with the addition of yellow chromate of potash, by which method a considerably yellower and fuller shade may be obtained.

Printing Directions.

20 — 50 parts by weight of dyestuff are dissolved in
485 — 425 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

15 — 30 parts by weight of yellow chromate of potash,
15 — 30 „ „ „ „ oxalate of ammonia and
5 „ „ „ „ chlorate of soda dissolved in
210 „ „ „ „ hot water, are added.
1000 parts.

For Red and Claret:

Diamine Fast Red F
Diamine Scarlet B, 3B
Vigoureux Red A

Diamine Fast Red and Diamine Scarlet are principally used for red effects, and in combination with Anthracene Yellow or Diamine Fast Yellow for orange effects. Diamine Scarlet is very fast to milling next to wool and is printed without chrome; Diamine Fast Red may also be fixed with chromium fluoride in order to increase its fastness to milling next to cotton. Vigoureux Red A dyes very fast shades of claret and is frequently also used for shading purposes.

Printing Directions.

For Diamine Fast Red F (without chrome) and Diamine Scarlet B, 3B:
Same as for Diamine Fast Yellow FF (page 335).

For Diamine Fast Red F with chrome:

20 – 40 parts by weight of Diamine Fast Red F are dissolved in
550 – 500 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

15 – 30 parts by weight of chromium fluoride and
15 – 30 „ „ „ „ oxalate of ammonia dissolved in
150 „ „ „ „ hot water are added.
1000 parts.

For Vigoureux Red A:

Same as for Anthracene Chrome Brown D (page 336).

Prints still faster to milling are produced according to the following recipe:

20 – 50 parts by weight of Vigoureux Red A are dissolved in
480 – 400 „ „ „ „ water and boiled with
250 „ „ „ „ British gum.

When cold,

40 – 60 parts by weight of acetic acid of 8° Tw. and
10 – 15 „ „ „ „ sulphuric acid of 168° Tw. diluted with
50 „ „ „ „ water are added, and also
25 – 50 „ „ „ „ chromium fluoride and
5 „ „ „ „ chlorate of soda dissolved in
120 „ „ „ „ hot water.
1000 parts.

For Violet:

Anthracene Chrome Violet B { is used for violets and as a shading product for prune shades and navy blues.

Printing Directions.

20 – 50 parts by weight of Anthracene Chrome Violet B and
3 „ „ „ „ sulphocyanide of ammonia are dissolved in
467 – 397 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

25 – 50 parts by weight of chromium fluoride,
15 – 30 „ „ „ „ oxalate of ammonia and
5 „ „ „ „ chlorate of soda dissolved in
215 „ „ „ „ hot water are added.
1000 parts.

For Navy Blue:

Anthracene Chrome Blue F
Anthracene Chrome Blue BB
Anthracene Chrome Blue G
Anthracene Chrome Blue B
Anthracene Chrome Blue R

} yield prints of excellent fastness to light, washing and water and have proved of eminent value for Vigoureux printing. The brands F, BB and G are the principal brands and, besides for blue, are also used extensively for green, olive and all other compound shades. The B and R brands are employed especially for reddish blues.

Brilliant Milling Blue or Formyl Violet may be used for shading.

Printing Directions.

20— 40 parts by weight of dyestuff and
3 „ „ „ „ sulphocyanide of ammonia are dissolved in
432—382 „ „ „ „ hot water and
250 „ „ „ „ British gum.

When cold,

20— 40 parts by weight of chromium fluoride and
5 „ „ „ „ chlorate of soda dissolved in
150 „ „ „ „ hot water are added, also
10— 20 „ „ „ „ oxalic acid dissolved in
100 „ „ „ „ hot water, and further
10 „ „ „ „ Turkey-red oil.
1000 parts.

The above products are also frequently printed with the addition of formate of chrome (same weight as of chromium fluoride), or acetate of chrome of 32° Tw. (four times the weight as of chromium fluoride), by which additions the shades turn out somewhat more greenish than is the case when using chromium fluoride.

For Olive and Green:

Vigoureux Green B
for olives shaded with
Anthracene Yellow BN
Vigoureux Red A

} Vigoureux Green B yields prints of excellent fastness to light and milling. When fixed with chromium fluoride, bluish green shades result and yellowish green shades when fixed with yellow chromate. Olive shades are produced by shading Vigoureux Green B with Anthracene Yellow BN and Vigoureux Red A.

Printing Directions.

I. With chromium fluoride:

20— 50 parts by weight of Vigoureux Green B and
3 „ „ „ „ sulphocyanide of ammonia are dissolved in
467—397 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

25— 50 parts by weight of chromium fluoride,
15— 30 „ „ „ „ oxalate of ammonia and
5 „ „ „ „ chlorate of soda dissolved in
215 „ „ „ „ hot water are added.
1000 parts.

II. With bichromate of potash:

20– 50 parts by weight of Vigoureux Green B and
3 „ „ „ „ sulphocyanide of ammonia are dissolved in
480–420 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

15– 30 parts by weight of yellow chromate,
15– 30 „ „ „ „ oxalate of ammonia and
5 „ „ „ „ chlorate of soda dissolved in
212 „ „ „ „ hot water are added.
1000 parts.

For Black:

Anthracene Chrome Black P extra	These colours have been very readily adopted in Vigoureux printing, on account of their excellent properties of fastness and easy method of fixation.
Anthracene Chrome Black F	The Anthracene Chrome Blacks yield the fastest shades as regards fastness to milling, and they are therefore always given the preference if a very good fastness to light combined with best resistance to milling next to wool and cotton is desired.
Anthracene Chrome Black FE	The FE gives the deepest, 5B the most bluish shades.
Anthracene Chrome Black 5B	Compared with Anthracene Chrome Black, Vigoureux Black S is only slightly inferior in point of fastness to milling next to cotton; for the normal class of woollen goods its fastness to milling is excellent.
Vigoureux Black S	
Anthracite Black EG	Anthracite Black EG possesses similar properties of fastness as Vigoureux Black, differing chiefly in so far as it is printed without chrome.

Printing Directions.

For Anthracene Chrome Black P extra, F, FE, 5B, Vigoureux Black S:

70–100 parts by weight of dyestuff and
3 „ „ „ „ sulphocyanide of ammonia are dissolved in
380–340 „ „ „ „ hot water and boiled with
225 „ „ „ „ British gum.

When cold,

50– 60 parts by weight of formate of chrome (or 50–60 parts of chromium fluoride for Anthracene Chrome Black F and FE),
50 „ „ „ „ oxalate of ammonia and
5 „ „ „ „ chlorate of soda dissolved in
207 „ „ „ „ hot water are added, and also
10 „ „ „ „ Turkey-red oil.
1000 parts.

Formate of chrome has proved an excellent fixing agent for Anthracene Chrome Black P extra and 5B as well as for Vigoureux Black S, but chromium fluoride may of course also be used in its stead. Besides, all the Anthracene Chrome Blacks enumerated and also Vigoureux Black S may be printed with

the addition of yellow chromate of potash; the Black produced is then of a considerably more covered shade.

For Anthracite Black EG:

60 – 80 parts by weight of Anthracite Black EG are dissolved in
445 – 425 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

20 parts by weight of chlorate of soda dissolved in
30 „ „ „ „ hot water and
20 „ „ „ „ oxalic acid dissolved in
175 „ „ „ „ hot water are added.
1000 parts.

Compound Shades (Mode Colours):

These may be produced according to three methods, viz,

1. By the requisite mixing of the ready print colours (standard colours) previous to printing.
2. By printing the requisite dyestuffs in large or small designs.
3. By mixing ready Vigoureux prints of suitable shades (white slubbing also if necessary) in the gill-box. The last named method is chiefly resorted to if only slight deviations in the shade have to be corrected.

The following dyestuffs are especially suited for working according to method 1:

For a yellow standard colour: Anthracene Yellow BN.
For a red standard colour: Vigoureux Red A.
For a blue standard colour: Anthracene Chrome Blue F, G.

For details regarding the preparation of the print colours see instructions on pages 334, 337 and 338.

B. Dyestuffs for Vigoureux Printing employed for Ladies' Dress Goods:

In the following the most suitable Acid and Diamine Colours are enumerated, the prints of which, in point of properties of fastness, answer the demands generally made for ladies' dress goods. If in exceptional cases still better fastness to milling is required,

the Chrome Colours enumerated on pages 334—340 and recommended for gentlemen's suitings come into consideration.

The following dyestuffs are principally employed:

For Yellow:

Milling Yellow 0	Thioflavine S
Acid Yellow AT	Diamine Yellow CP
Anthracene Yellow C paste (printed without chrome)	Diamine Fast Yellow A, FF.

For Orange:

Orange GG	Diamine Orange F.
Orange II, extra	

For Brown:

Anthracene Acid Brown G	printed without chrome.	Diamine Brown M
Anthracene Acid Brown R		Diamine Brown B
Anthracene Acid Brown N		Diamine Catechine G
Anthracene Acid Brown B		further, combinations of
Anthracene Acid Brown V		Milling Yellow 0
Diamine Brown 3G		Lanafuchsine 6B
Diamine Brown R		Brilliant Milling Green B.

For Pink and bright Red:

Rosazeïne B	Lanafuchsine SG, SB
Scarlet FR, F2R, F3R	Milling Red G
Brilliant Cochineal 2R, 4R	Diamine Scarlet B, 3B
Crystal Scarlet 6R	Diamine Purpurine B, 3B, 6B.

For deep Red and Claret:

Azo Rubine A	Milling Red FR
Amaranth	Wool Red B, BG
Naphtol Red C, EB	Diamine Fast Red F
Azo Red A	Diamine Rose, all brands
Lanafuchsine 6B	Diamine Bordeaux S, B.

For Purple:

Formyl Violet, all brands	Acid Violet 6BS.
Azo Wool Violet 4B, 7R	

For bright Blue:

Cyanole extra, FF
Tetra Cyanole V, SF, extra
Alkaline Blue, all brands
Water Blue B, RB, R
Brilliant Milling Blue B.

For Blue and Navy Blue:

Formyl Blue B
Solid Blue BD, BBD, BRD, 3RD
Naphtol Blue G, R
Diamine Blue 2B, 3B.

For Green and Olive:

Brilliant Milling Green B
Cyanole Fast Green G
Acid Green extra conc.
Acid Green extra conc. B
Cyanole Green B, 6G
Naphtol Green B
for Olives in combination with
Milling Yellow 0
Acid Yellow AT
Lanafuchsine 6B
Diamine Green B, G
Diamine Dark Green N
for Olives in combination with
Diamine Fast Yellow FF
Diamine Yellow CP
Diamine Brown R.

For Black:

Naphtol Black BDF
Naphtol Black BG conc.
Naphtol Black BGN conc.
Anthracite Black EG.

For Compound Shades (Mode Colours):

Compound shades are produced according to the same three methods detailed on page 340 for gentlemen's suitings.

The following dyestuffs are especially suitable for working according to method I:

For a yellow standard colour: Milling Yellow 0
For a red standard colour: Lanafuchsine SG
For a blue standard colour: Tetra Cyanole V.

The properties of the above-named products are referred to in detail in the chapter on the printing of woollen fabrics, on pages 320—330.

Printing Directions.

For all Acid Colours with the exception of Naphtol Green, Naphtol Black and Anthracite Black:

10 — 40 parts by weight of dyestuff are dissolved in
580 — 540 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

10 — 20 parts by weight of oxalic acid dissolved in
150 „ „ „ „ hot water, are added.
1000 parts.

For Naphtol Green B:

40 — 80 parts by weight of dyestuff are dissolved in
600 — 530 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

20 — 30 parts by weight of chlorate of soda dissolved in
60 „ „ „ „ hot water, and then
30 — 50 „ „ „ „ acetic acid of 8° Tw., are added.
1000 parts.

For Naphtol Black BDF:

60 — 80 parts by weight of Naphtol Black BDF and
5 „ „ „ „ Brilliant Milling Green B are dissolved in
435 — 415 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

15 parts by weight of chlorate of potash dissolved in
25 „ „ „ „ hot water, and
15 „ „ „ „ alum and
20 „ „ „ „ oxalic acid dissolved in
175 „ „ „ „ hot water, are added.
1000 parts.

For Naphtol Black BG conc. and BGN conc.

50 — 70 parts by weight of dyestuff are dissolved in
450 — 430 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

15 parts by weight of chlorate of soda dissolved in
25 „ „ „ „ hot water, and
15 „ „ „ „ alum and
20 „ „ „ „ oxalic acid dissolved in
175 „ „ „ „ hot water, are added.
1000 parts.

For Anthracite Black EG:

60— 80 parts by weight of Anthracite Black EG are dissolved in
445—425 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

20 parts by weight of chlorate of soda dissolved in
30 „ „ „ „ hot water and
20 „ „ „ „ oxalic acid dissolved in
175 „ „ „ „ hot water, are added.
1000 parts.

For all Diamine Colours:

5— 40 parts by weight of dyestuff are dissolved in
640—590 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum and
5— 20 „ „ „ „ phosphate of soda dissolved in
100 „ „ „ „ hot water.
1000 parts.

For Anthracene Yellow C paste (without chrome):

25—100 parts by weight of dyestuff are dissolved in
550—450 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

25— 50 parts by weight of oxalate of ammonia dissolved in
150 „ „ „ „ hot water, are added.
1000 parts.

For Anthracene Acid Brown G, R, N, B and V (without chrome):

20— 50 parts by weight of dyestuff are dissolved in
585—530 „ „ „ „ hot water and boiled with
250 „ „ „ „ British gum.

When cold,

25— 50 parts by weight of oxalate of ammonia dissolved in
120 „ „ „ „ hot water, are added.
1000 parts.

Fancy Shades for Ladies' Dress Materials.

These are produced by printing black or complementary colours on slubbing previously dyed in bright colours such as yellow, red, blue, green etc.

Yarn Printing.

Treatment of the Yarns before printing.

Before printing, the yarns should be thoroughly scoured and washed. This is best done by immersing them over night in boiling water, and then scouring them well (with soda or ammonia and soap), as described on page 185 in the chapter on "The Dyeing of Woollen and Worsted Yarns".

Frequently, in order to produce a good white, the yarn is bleached after the scouring, either by a light stoving in the sulphur stove, or with bisulphite and sulphuric acid, more recently also with peroxide of hydrogen or peroxide of sodium. After bleaching, the yarn is very thoroughly rinsed and dried.

As a rule, a special preparation of the yarns before printing can be dispensed with; only carpet yarns should be subjected to a "sulphuring" process as described below.

If in isolated cases the yarn is to be prepared with chlorine or tin, this may be done according to the instructions given in detail on page 208 and 317 respectively.

To produce print patterns with a very sharp outline the goods are sometimes treated with alum. The scoured (and if necessary bleached) yarn is then treated for about 10 minutes in a cold bath containing 4—8 oz alum per 10 gallons liquor, hydroextracted, and dried.

"Sulphuring" Carpet Yarns.

The well scoured yarn is hung up for several hours in a sulphur stove in which sulphur is burnt, the admittance of air being so regulated as to allow of as much as possible of the finely distributed sulphur sublimating on to the wool in the form of flower sulphur. The yarn is then rinsed in lukewarm water in order to remove any excess of sulphurous acid and the "sulphuring" and rinsing repeated in the same manner.

Printing, Steaming, and Scouring.

With regard to the application of the dyestuffs, the preparation of the print colours, the printing proper, steaming and washing of the goods, yarn printing is so closely allied to the printing of slubbing that the details and instructions regarding the latter, given on pages 331—344, apply equally to the printing of yarn.

For the production of prints answering normal requirements in point of fastness to washing, the Acid Colours enumerated on pages 340—344 sub B are used in the first place, whereas for prints required to be especially fast to washing and milling, the Diamine Colours mentioned on the above pages and the Anthracene Colours on pages 334—340 sub A, are employed.

The Anthracene Colours are especially serviceable for the printing of carpet yarns, because in addition to excellent fastness and very good levelling properties, they offer the advantage of not changing their shade in artificial light at all or but very slightly.

Especially favourite combinations for compound shades are such of

Anthracene Chrome Blue G
Anthracene Yellow BN
Anthracene Chrome Brown D
Anthracene Chrome Red A.

The following Acid and Diamine Colours are fast to light and on this account chiefly suitable for the printing of carpet yarns:

Acid Colours:

Milling Yellow 0
Acid Yellow AT
Orange GG, II, extra
Brilliant Cochineal 2R, 4R
Azo Rubine A
Lanafuchsine SG, 6B
Milling Red FR
Wool Red B
Azo Wool Violet 7R
Alkaline Blue, all brands
Cyanole extra, FF
Tetra Cyanole V, SF, extra
Solid Blue BD, BBD, BRD, 3RD
Cyanole Fast Green G
Cyanole Green B, 6G
Naphtol Green B
Silver Grey N
Naphtol Black BDF, BG conc., BGN conc.
Anthracite Black EG.

Diamine Colours:

Diamine Yellow CP	Diamine Bordeaux B
Diamine Fast Yellow FF, A	Diamine Violet N
Diamine Fast Red F	Diamine Green B, G
Diamine Scarlet B, 3B	Diamine Dark Green N.

The usual yarn printing machines are used for printing; long-reeled carpet yarns intended to show so-called "Iris" effects are as a rule printed by hand.

After printing, the yarn is only lightly dried and steamed for 1—2 hours, according to requirement, in very moist steam, then rinsed thoroughly, and dried.

Discharge Printing.

Hyraldite W has proved of excellent value for discharging wool both white and in colours. For the latter, tin crystal discharges are still used in some isolated cases, amongst others especially for the favourite blue and red discharge styles.

White and Coloured Discharges with Hyraldite W.

In order to obtain good white effects it is advisable to use as white goods as possible; it is therefore best to bleach woollen material with a pronounced yellowish tinge before dyeing by means of peroxide of hydrogen or by stoving.

After bleaching, the goods are chlored in the usual manner, rinsed, and dyed.

The following dyestuffs are easily dischargeable with Hyraldite W and yield stable, permanent discharge effects:

I. Acid Colours.

[1]) Acid Yellow AT	[1]) Acid Violet 4RS
[1]) Fast Yellow S	[1]) Cyanole extra, FF (in pale shades)
[1]) Orange GG, extra, II, R	[1]) Azo Wool Blue C
[1]) Lanafuchsine SG	[2]) Discharge Blue B, G
[1]) Scarlet FR, F2R, F3R	[2]) Naphtol Blue G
[1]) Brilliant Scarlet GG—3R	[2]) Lanacyl Navy Blue B
[1]) Naphtol Red C	[1]) Naphtylamine Black EFF.

Method of dyeing the dyestuffs marked [1]).

Charge the dyebath with

10% Glauber's salt crystals
5% bisulphate of soda
or
20% Glauber's salt crystals
2% sulphuric acid of 168° Tw.

and the requisite quantities of dyestuff, enter the chlored and rinsed goods lukewarm, raise within 30—40 minutes to the boil, and continue boiling for 1 hour. In order to better exhaust the bath in the case of deep shades, some bisulphate of soda or sulphuric acid is then added and boiling continued for another 20—30 minutes.

After dyeing, rinse in cold water, and dry.

For subsequent shading, any of the above mentioned dyestuffs may be used. The bath is cooled off to some extent and gradually brought again to the boil. The cooling off is especially important when using Scarlet, Brilliant Scarlet, Naphtol Red, Acid Violet, Azo Wool Blue C and Naphtylamine Black.

Method of dyeing the dyestuffs marked [2]).

Charge the dyebath with

20% Glauber's salt crystals
5% acetic acid and the dyestuff.

Enter the chlored and thoroughly rinsed goods lukewarm, raise within 30 — 40 minutes to the boil, and continue boiling for about 1/2 hour; in order to exhaust the bath, add 10% bisulphate of soda in the case of Discharge Blue B and G, 4 — 6% bisulphate of soda for Naphtol Blue G and Lanacyl Navy Blue B, well diluted with water and in two portions, and boil for about another 1/4 hour after the last addition.

If only small additions are necessary for subsequent shading, such levelling colours as

Acid Yellow AT	Cyanole extra, FF
Orange GG	Azo Wool Blue C,
Lanafuchsine SG	

are used, which may be added to the boiling bath direct. When shading however with Discharge Blue, Naphtol Blue or Lanacyl Navy Blue, the bath must first be cooled off to about 70° C. (160 deg. F.) with cold water, when it is again brought gradually to the boil.

II. Diamine Colours.

Diamine Yellow CP	Diamine Brown M, R
Oxy Diamine Orange G, R	Diamine Catechine G.

Diamine Rose GD, BD	Diamine Sky Blue FF
Diamine Scarlet B, 3B	Diamine Blue 2B, 3B, RW
Diamine Red 4B	Diamine Brilliant Blue G
Diamine Fast Red F	Diamine Green G, B, CL
Diamine Bordeaux B	Diamine Dark Green N
Diamine Violet N	Diaminogene extra
Oxy Diamine Violet B, R, G	Discharge Black N.
Oxy Diamine Blue G, B	

Method of Dyeing.

Charge the dyebath with

10% Glauber's salt crystals and the dyestuff,

enter the chlored and very thoroughly rinsed goods lukewarm, raise within 3/4 hour to the boil, boil for about 3/4 hour, rinse and dry.

If some more dyestuff is to be added for shading, the bath must first be cooled off somewhat and then brought again gradually to the boil.

III. Chrome Colours.

Anthracene Chrome Blue R	Anthracene Chrome Red A
Anthracene Yellow BN	Anthracene Chrome Violet B.

Method of Dyeing.

Mordant the goods, according to the depth of shade desired, with

2 —4% bichromate of potash and

1½—3% tartar,

entering at 50—60° C. (120—140 deg. F.), raising in ½ hour to the boil, and boiling for 1½ hour. Then rinse, and dye with the requisite dyestuffs in a fresh bath with the addition of

1—3% acetic acid or

5% acetate of ammonia*) (for very pale shades).

Enter at 40—50° C. (105—120 deg. F.), raise in ½ hour to the boil, and boil for 1—2 hours. In order to exhaust the baths, add gradually, after 1 hour's boiling,

3—6% acetic acid,

according to requirement.

*) Details of preparing the acetate of ammonia are given in the footnote on page 114.

When dyeing in copper vessels, charge the hot dyebath first with

¼–½% sulphocyanide of ammonia (of the weight of the goods), stir well, and leave standing for 20 minutes before adding the Glauber's salt, acid and dyestuff.

For subsequent shading, such levelling colours as

Acid Yellow AT	Cyanole extra, FF
Orange GG	Azo Wool Blue C
Lanafuchsine SG	

are best used which may be added straight to the boiling liquor.

Easily dischargeable shades are best dyed with the following combinations:

For Pink and Red:

Lanafuchsine SG
Scarlet FR, F2R, F3R
Brilliant Scarlet GG—3R
Naphtol Red C.

For dyeings fast to milling:

Diamine Rose GD, BD
Diamine Scarlet B, 3B
Diamine Red 4B
Diamine Fast Red F.

For Yellow and Orange:

Acid Yellow AT
Fast Yellow S
Orange GG, extra, II, R.

For dyeings fast to milling:

Diamine Yellow CP
Oxy Diamine Orange G, R
or
Diamine Yellow CP
shaded with
Diamine Scarlet B
} for Orange.

For Brown:

Combinations of
Lanafuchsine SG
Acid Yellow AT
Azo Wool Blue C.

For dyeings fast to milling:

Diamine Brown M, R
Diamine Catechine G
if necessary shaded with
Oxy Diamine Orange G, R
Diaminogene extra
or, combinations of
Anthracene Yellow BN
Anthracene Chrome Red A
Anthracene Chrome Blue R.

For Grey and Mode Shades:

Combinations of
Acid Yellow AT
Orange GG
Lanafuchsine SG
Azo Wool Blue C
Cyanole extra, FF (for pale shades).

For dyeings fast to milling:

Combinations of
Diamine Brown M, R
Diamine Yellow CP
Diaminogene extra
Diamine Scarlet B
or such of
Anthracene Yellow BN
Anthracene Chrome Red A
Anthracene Chrome Blue R.

For Violet and Claret:

Acid Violet 4RS
Naphtol Red C
if necessary shaded with
Cyanole extra, FF
Orange GG, extra.

For dyeings fast to milling:

Diamine Violet N
Oxy Diamine Violet B, R, G
Diamine Bordeaux B
if necessary shaded with
Diamine Brilliant Blue G
Oxy Diamine Orange G.

For Blue:

For pale brilliant blues:

Cyanole extra, FF.

For medium and navy blue shades:

Discharge Blue B, G
if necessary shaded with
Cyanole extra, FF
Acid Violet 4RS.

Azo Wool Blue C
if necessary shaded with
Orange GG
Lanafuchsine SG.

Oxy Diamine Blue G, B
if necessary shaded with
Diamine Green CL.

For dyeings fast to milling:

Oxy Diamine Blue G, B
Diamine Sky Blue FF
Diamine Blue 2B, 3B, RW
Diamine Brilliant Blue G.

The following dyestuffs are especially suitable for blues on gentlemen's suitings:

Naphtol Blue G
Lanacyl Navy Blue B
further:
Anthracene Chrome Blue R
if necessary shaded with
Cyanole extra, FF.

For Green and Olive:

Azo Wool Blue C
in combination with
Acid Yellow AT
Orange GG
Lanafuchsine SG
Cyanole extra, FF.

For dyeings fast to milling:

Diamine Green CL, B, G
Diamine Dark Green N
if necessary shaded with
Oxy Diamine Orange G, R
Diamine Yellow CP.

For Black:

Naphtylamine Black EFF,
which has proved the best black for discharge purposes;
Discharge Black N,
which is dyed as stated on page 350 for Diamine Colours.

Method of Discharging.

White Discharge.

400–500 parts by weight of Hyraldite W and
25 „ „ „ „ zinc white are stirred to a paste with
500–400 „ „ „ „ neutral starch-tragacanth thickening, heated for about 20 minutes to 70° C. (160 deg. F.) and then stirred until cold. When completely cold,
75 „ „ „ „ albumen solution 1:1 are added and the whole is passed through a fine sieve.

1000 parts.

Neutral starch-tragacanth thickening.

100–120	parts	by	weight	of	wheat starch,
490–470	„	„	„	„	water,
400	„	„	„	„	tragacanth 65 : 1000 and
10	„	„	„	„	glycerine are boiled for ½ hour and stirred
1000	parts.				[until cold.

The starch-tragacanth thickening has proved the best thickening agent for the purpose.

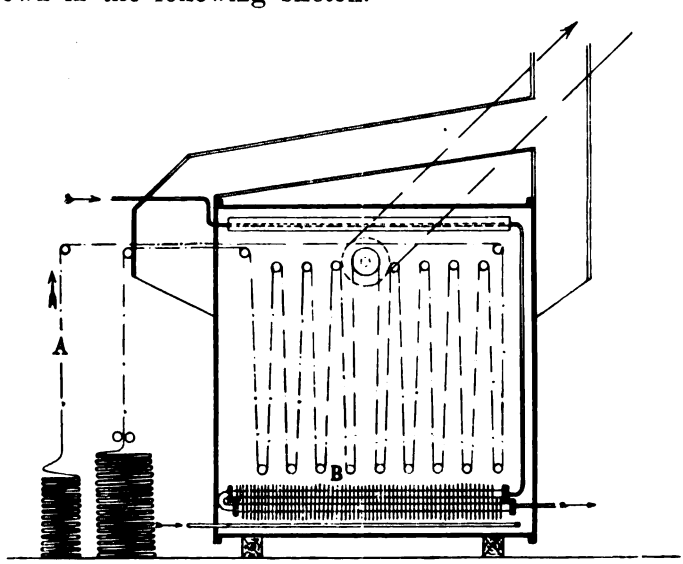
The drying chamber must not be too hot when printing, because the print effects turn out best if the goods come but moderately dry from the drying chamber.

Severely dried pieces must be moistened before steaming, which is best done by means of a damp cloth. The printed woollen goods are wrapped up in the moist dampers, left lying for several minutes, then unrolled and steamed.

On the other hand it is most important to use as dry steam as possible for steaming.

The steaming lasts 3–5 minutes.

The temperature of the steam-chest should be about 100—105° C. (212—220 deg. F.), which is attained by reducing to the smallest possible size the openings by which the goods pass in and out. More powerful heating arrangements than ordinarily employed may also be provided inside the Mather & Platt as shown in the following sketch.



The goods to be discharged (A) enter the Mather & Platt. B are gilled pipes, the number of which depends on the size of the steamer.

The other arrangements are the same as in the ordinary Mather & Platt.

If there is no Mather & Platt available, the goods may also be steamed in a round steamer or in any ordinary steam-chest, provided such an apparatus is sufficiently heated, previous to entering the goods, by heating arrangements fixed inside. In this instance, too, the temperature in the steam-chest should be about 100 –105° C. (212—220 deg. F.); it is then sufficient to steam for 6—8 minutes.

After steaming, the goods are lightly rinsed in cold water, hydroextracted, and dried.

According to necessity, the white is brightened in the last rinsing bath by the addition of some Formyl Blue, Brilliant Milling Blue or Formyl Violet.

Coloured discharge.

20— 50	parts	by	weight	of	dyestuff are dissolved in
400—370	„	„	„	„	water and boiled with
180	„	„	„	„	British gum; whilst cooling,
400	„	„	„	„	Hyraldite W are added.
1000	parts.				

The print colour should be passed through a fine sieve. After being printed, the goods are steamed for a few minutes as above stated, washed, and dried.

With some colours (those marked with an asterisk (*) it is advisable after steaming to lightly chrome with about 4 oz bichromate of potash per 100 gallons liquor, in order to assist the re-formation of the dyestuff reduced by steaming to its leuko-base; in this way the coloured discharge effect is more easily developed.

The following dyestuffs may be used as additions to the discharges:

For Yellow:

Thioflavine T
Thioflavine S
Diamine Fast Yellow FF
Primuline
Phosphine II.

For Blue:

*New Methylene Blue NSS
*Thiocarmine R
*Solid Blue R and 3R.

For Red:

Erythrosine B
Eosine GGF
Phloxine
Rosazeïne B
*Irisamine G pat.
*Azo Orseille BB.

Green is produced by mixing the respective yellow and blue, Violet by mixing blue and red dyestuffs.

Coloured Discharges with Tin Crystals.

The Acid and Diamine Colours enumerated on pages 348—350 are well suited for dyeing the goods.

Tin crystals discharge.

372 parts by weight of water,
184 „ „ „ „ wheat starch,
147 „ „ „ „ white dextrine and
22 „ „ „ „ tartaric acid are boiled together, then
220 „ „ „ „ tin crystals, and when cold
55 „ „ „ „ acetate of soda, are added.
1000 parts.

After printing, steam for about 10 minutes, and wash.

Acetate of tin discharge.

This discharge requires a more prolonged steaming than the tin crystals discharge and is chiefly used for illumination effects.

760 parts by weight of acetate of tin of 28° Tw.,
185 „ „ „ „ wheat starch and
55 „ „ „ „ white dextrine are boiled together.
1000 parts.

After printing, steam for 1 hour without pressure, and wash.

Preparation of the coloured discharges:

10— 50 parts by weight of dyestuff are dissolved in
240—200 „ „ „ „ hot water and boiled with
150 „ „ „ „ British gum; when cold,
600 „ „ „ „ discharge are stirred into this mixture.
1000 parts.

The following dyestuffs may be added to the discharges:

For Yellow:

Thioflavine T	Diamine Fast Yellow FF
Phosphine IIa	Primuline
Thioflavine S	Oxy Diamine Yellow GG.

For Blue:

Formyl Blue B	New Methylene Blue, all brands
Brilliant Milling Blue B	New Blue, all brands
Cyanole extra, FF	Indazine M
Alkaline Blue, all brands	Methylindone B, R.
Water Blue, all brands	

For Violet:

Formyl Violet, all brands	Methyl Violet, all brands.

For Red:

Erythrosine B	Rosazeïne B
Eosine, all brands	Irisamine G
Phloxine S	Safranine, all brands
Rose Bengale extra N	Azo Orseille BB.

For Green:

Acid Green extra conc.	Cyanole Green B, 6G
Acid Green extra conc. B	Solid Green crystals 0
Brilliant Milling Green B	Brilliant Green crystals extra.
Cyanole Fast Green G	

The favourite

Blue-Red Discharge Style

may be produced according to the following recipe:

The goods are dyed as detailed on page 348, for instance with

3% Scarlet F3R,

rinsed, dried, and printed with the following Blue Discharge:

40— 50 parts by weight of Formyl Blue B are dissolved in
210—200 „ „ „ „ hot water and boiled with
150 „ „ „ „ British gum.

When cold,

600 parts by weight of acetate of tin discharge are added.

1000 parts.

After printing, steam for 1 hour without pressure, wash, and dry.

Appendix.

Water and Important Chemicals.

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Water.

For all purposes of dyeing a high degree of purity of the water is very desirable. Apart from other impurities of less frequent occurrence, the sulphates of lime and magnesia and the bicarbonates of lime, magnesia and iron constitute the so-called hardness of the water. They are detrimental to dyeing, as they precipitate dyestuffs, mordants and soap, and may thereby cause stains and irregular results.

Condensed water is very suitable and pure. It may be easily collected in most dyehouses and does excellent service, especially for dissolving dyestuffs and in machine-dyeing. By means of an oil separator it may easily be freed of any oil occurring in isolated cases.

Rain water is also very good and serviceable, if it can be easily collected, as is also the case with water from ponds and lakes if free from mud and other detrimental impurities.

Hard water is best purified by boiling with soda. The water is boiled with soda in a separate vessel and the precipitate allowed to settle. For scouring wool the water may be used direct (unless a great excess of soda was used for softening). For dyeing purposes the water should be carefully acidulated with acetic or sulphuric acid until red litmus paper no longer turns blue and blue litmus paper is only very slightly reddened.

For purifying water by means of soda, a number of engineering works build special apparatus which have given great satisfaction generally. In the absence of an apparatus of this kind the purification may be effected in large wooden vats.

The water to be corrected is then mixed for each English degree of hardness with a solution of 2½ oz soda ash per 1000 gallons; for instance, with water of 20 degrees of hardness, 50 oz soda per 1000 gallons are required. After boiling up well, the precipitate formed is allowed to settle and the clear soft water carefully acidulated with acetic or sulphuric acid as indicated above.

For purifying large quantities of water it is best to employ two vessels, boiling up fresh water in one whilst the precipitate is settling in the other.

Sulphuric Acid.

Sulphuric acid is an oily colourless liquid (sometimes coloured brownish by the presence of small quantities of organic substances).

For dyeing, the ordinary commercial sulphuric acid, so-called "Oil of Vitriol" (O. V. or D. O. V., i. e. Double O. V.) is usually employed. It should contain 93—98% pure sulphuric acid.

Fuming or Nordhausen sulphuric acid contains sulphuric anhydride and is not used in dyeing.

Sulphuric acid absorbs water from the air with great avidity and should therefore be kept in closed vessels. On mixing with water it evolves great heat. In order to avoid dangerous boiling up and spattering, sulphuric acid should always be diluted by being poured in a thin stream into a large quantity of cold water, stirring well all the time. The water must not be warm and on no account should water be poured into the strong acid. Sulphuric acid diluted with half its weight of water does not give off great heat on being further diluted.

Sulphuric acid is very extensively employed in wool dyeing, especially in dyeing with Acid Colours or Chrome Colours. It is frequently used in the form of bisulphate of soda, 2½ parts of which are about equivalent to 1 part of sulphuric acid. Sulphuric acid is however always preferred to the commercial bisulphate for dyeing bright shades of scarlet, as the shades come out more brilliant with the former. (See page 370).

A somewhat larger amount of Glauber's salt should be added when dyeing with sulphuric acid than with bisulphate of soda, as the latter may be considered as a combination of sulphuric acid and Glauber's salt which in dyeing decomposes into sulphuric acid and Glauber's salt.

The strength of sulphuric acid may be determined with the hydrometer according to the following table:

Specific Gravity of Sulphuric Acid at 59° F.

(Lunge and Isler.)

Degrees Twaddle	Per cent sulphuric acid	Degrees Twaddle	Per cent sulphuric acid	Degrees Twaddle	Per cent sulphuric acid	Degrees Twaddle	Per cent sulphuric acid
2	1.57	48	32.28	94	56.90	140	77.17
4	3.03	50	33.43	96	57.83	142	78.04
6	4.49	52	34.57	98	58.74	144	78.92
8	5.96	54	35.71	100	59.70	146	79.80
10	7.37	56	36.87	102	60.65	148	80.68
12	8.77	58	38.03	104	61.59	150	81.56
14	10.19	60	39.19	106	62.53	152	82.44
16	10.90	62	40.35	108	63.43	154	83.32
18	12.99	64	41.50	110	64.26	156	84.50
20	14.35	66	42.66	112	65.08	158	85.70
22	15.71	68	43.74	114	65.90	160	86.90
24	17.01	70	44.82	116	66.71	162	88.30
26	18.31	72	45.88	118	67.59	164	90.05
28	19.61	74	46.94	120	68.51	165	91.00
30	20.91	76	48.00	122	69.43	166	92.10
32	22.19	78	49.06	124	70.32	167	93.43
34	23.47	80	50.11	126	71.16	168	95.60
36	24.76	82	51.15	128	71.99	168.3*	97.70
38	26.04	84	52.15	130	72.82	168.1*	98.70
40	27.32	86	53.11	132	73.64	168*	99.20
42	28.58	88	54.07	134	74.51	167.7*	99.95
44	29.84	90	55.03	136	75.42		
46	31.11	92	55.97	138	76.30		

*) Sulphuric acid of 97,70% has the highest specific gravity, whilst that of stronger acid is a little lower.

Hydrochloric or Muriatic Acid or Spirits of Salts.

Hydrochloric or muriatic acid appears in commerce either as a colourless liquid or coloured greenish yellow by traces of iron. The commercial acid usually has a specific gravity of 26–38° Tw. and is contaminated with iron, arsenic, sulphuric acid and organic matter. For general dyeing purposes it is sufficiently pure.

Unlike sulphuric acid, hydrochloric acid forms a freely soluble lime salt (calcium chloride) and is therefore generally to be given the preference over sulphuric acid in souring off for the purpose of removing lime salts.

The strength of the hydrochloric acid can be determined with the hydrometer according to the following table:

Specific Gravity of Hydrochloric Acid at 59° F.

(Lunge and Marchlewski.)

Degrees Twaddle	Per cent hydrochloric acid	Degrees Twaddle	Per cent hydrochloric acid	Degrees Twaddle	Per cent hydrochloric acid	Degrees Twaddle	Per cent hydrochloric acid
1	1.15	11	11.18	21	20.97	31	30.55
2	2.14	12	12.19	22	21.92	32	31.52
3	3.12	13	13.19	23	22.86	33	32.49
4	4.13	14	14.17	24	23.82	34	33.46
5	5.15	15	15.16	25	24.78	35	34.42
6	6.15	16	16.15	26	25.75	36	35.39
7	7.15	17	17.13	27	26.70	37	36.31
8	8.16	18	18.11	28	27.66	38	37.23
9	9.16	19	19.06	29	28.61	39	38.16
10	10.17	20	20.01	30	29.57	40	39.11

It will be noticed that each degree Twaddle indicates approximately 1% pure hydrochloric acid.

Acetic Acid.

Acetic acid is produced by the destructive distillation of wood. The pure concentrated acetic acid solidifies at the ordinary temperature and forms crystals of ice-like appearance. It is therefore called glacial acetic acid. On account of its high price it is however not used for dyeing purposes.

Commercial acetic acid is a colourless liquid usually containing 30—50% pure acetic acid. It contains from its preparation pyroligneous substances and traces of mineral acids in addition to water, or it may be adulterated intentionally by mineral acids. An admixture of the latter is liable to be especially injurious in acetic acid used for dyeing union goods, as the mineral acids may tender the cotton during storing. For most other purposes a small admixture of mineral acids is of no consequence.

Acetic acid is used in wool dyeing for acidulating liquors for mordanting, dyeing and aftertreating, particularly for dyeing in weakly acid baths, in order to exhaust the dyestuffs gradually and evenly; it is especially used in cases in which sulphuric acid would act too rapidly.

The hydrometer is not satisfactory for an exact determination of the strength of acetic acid, but it is frequently employed in order to approximately estimate its strength.

Specific Gravity of Acetic Acid at 59° F.

(Oudemans.)

Per cent acetic acid	Degrees Twaddle	Per cent acetic acid	Degrees Twaddle	Per cent acetic acid	Degrees Twaddle	Per cent acetic acid	Degrees Twaddle	Per cent acetic acid	Degrees Twaddle
5	1.3	25	7.0	45	11.4	65	14.3	85	14.8
10	2.8	30	8.2	50	12.3	70	14.7	90	14.3
15	4.3	35	9.4	55	13.1	75	14.9	95	13.2
20	5.7	40	10.5	60	13.7	80	15.0	100	11.1

The specific gravities above 11° Tw. correspond to two liquids of different strengths. To ascertain whether the acid contains more or less than 77% pure acetic acid, a small quantity of water should be added after measuring; if, on again measuring, a higher specific gravity is found, the acid contains more than 77%, otherwise less.

Formic Acid.

Formic acid is for some time past being manufactured by a special process at a price which allows of its use in dyeing.

Pure formic acid is a colourless liquid which forms in the cold a crystalline mass melting at 8,6° C. (47.7 deg. F.) and boils at 100.8° C. (213.4 deg. F.); its specific gravity at 15° C. (59 deg. F.) is 1.256. The concentrated acid smells pungent and produces blisters on the skin. It is miscible with water in all proportions and evaporates with vapours of water.

Formic acid is sold in different concentrations, especially in concentrations of 98% and 85% pure acid.

Formic acid behaves very similarly to acetic acid in dyeing with Acid Colours, Chrome Colours etc., but acts 2½ times stronger than the latter when containing the same percentage of acid. It resembles acetic acid also in not impairing the vegetable fibres.

Formic acid may very well be used in place of sulphuric acid (see for instance page 165) as long as its higher price does not stand in the way; 1 part of concentrated formic acid would be about equivalent to 1 part of concentrated sulphuric acid.

Formic acid may also serve as a substitute for tartar in mordanting wool with bichrome.

Oxalic Acid.

Oxalic acid forms colourless crystals which dissolve at ordinary temperatures in about eight times their weight of water and very freely at higher temperatures. Oxalic acid and its salts are poisonous.

Commercial oxalic acid is a nearly pure article.

Oxalic acid is a strong acid which behaves in general similarly to sulphuric acid in dyeing with Acid Colours and is used especially in wool printing for fixing the Acid Colours. It also possesses strong reducing power and is for this reason frequently used as a tartar substitute in mordanting with chromium compounds. Owing to its property of forming a lime-salt entirely insoluble in water or acetic acid, it is used in dyeing some Acid Colours, principally Naphtyl Blue Black N and Naphtylamine Black R, RNB and NBB in combination with sulphate of copper, in order to precipate the lime-salts usually contained in water and thus render them harmless. It is also used in one-dip dyeing of logwood-iron-black. In these cases oxalic acid cannot be replaced by sulphuric acid, the latter rendering the absorption of the iron and copper salts more difficult.

Lactic Acid.

Lactic acid is manufactured on a large scale by the fermentation of various kinds of sugar. The pure acid is a colourless liquid, which, when well cooled, solidifies and yields a hard crystalline mass melting at 18° C. (64.4 deg. F.) and boiling under a pressure of 15 mm at 122° C. (251.6 deg. F.). It mixes with water in all proportions.

Commercial lactic acid forms a yellow or brown syrup containing 50--70% pure lactic acid, and some sulphuric acid, sugar, dextrine, iron and other impurities. Owing to its stronger reducing power it is frequently used in mordanting with chrome, as a substitute of tartar or oxalic acid. The acid salts of lactic acid and alkalies commercially known as "Lactoline" serve also for the same purpose.

Tartaric Acid.

Tartaric acid is on the market in the form of large colourless crystals, very easily soluble in water, but less soluble in alcohol. 100 parts of water will dissolve 115 parts of tartaric acid at 0° C. (32 deg. F.) and 140 parts at 20° C. (68 deg. F.). The article is extensively used in wool printing for fixing Acid Colours.

Oleïc Acid or Oleïne.

Crude oleïc acid, the so-called "Oleine", is a bye-product in the manufacture of stearic acid and forms an oil, insoluble in water, which melts at 14° C. (57.2 deg. F.). Its alkali salts are readily soluble in water, the other salts however are not soluble.

Oleïne is used in great quantities for oiling wool and for the preparation of soap for wool-scouring, also for other purposes of dyeing. To prepare a neutral soap, for 100 parts of oleïne about 48 parts of good potash or 38 parts of soda ash are used.

Caustic Soda or Sodium Hydrate; Caustic Soda Lye.

Caustic soda or sodium hydrate is sold in the form of a white molten mass, packed in iron drums. It is very freely soluble in water and absorbs water with avidity even from the air, which causes it to liquefy at first, but by attracting carbon dioxide from the air, thus forming sodium carbonate, it soon again solidifies. It is very caustic and has a caustic alkaline taste.

The commercial product usually contains 77 – 97% pure sodium hydrate.

Caustic soda lye is the aqueous solution of caustic soda.

Caustic soda and caustic soda lye are used in vat dyeing and for the preparation of soap.

The following table may serve for determining the strength of caustic soda lye by means of the hydrometer. It will be noticed, however, that this instrument does not indicate the amount of soda, salt or Glauber's salt which the lye may contain, although such impurities increase the specific gravity.

Specific Gravity of Caustic Soda Lye at 59° F.

(Schiff and Gerlach.)

Per cent Sodium Hydroxide	Degrees Twaddle	Per cent Sodium Hydroxide	Degrees Twaddle	Per cent Sodium Hydroxide	Degrees Twaddle
1	2.4	21	47.2	41	89.4
2	4.6	22	49.4	42	91.5
3	7.0	23	51.6	43	93.6
4	9.2	24	53.8	44	95.6
5	11.8	25	55.8	45	97.6
6	14.0	26	58.0	46	99.8
7	16.2	27	60.0	47	101.6
8	18.4	28	62.0	48	103.8
9	20.6	29	64.2	49	105.8
10	23.0	30	66.4	50	108.0
11	25.2	31	68.6	51	110.0
12	27.4	32	70.2	52	112.0
13	29.6	33	72.6	53	114.0
14	31.8	34	74.8	54	116.0
15	34.0	35	76.8	55	118.2
16	36.2	36	79.0	56	120.2
17	38.4	37	81.0	57	122.2
18	40.4	38	83.0	58	124.4
19	42.6	39	85.2	59	126.6
20	45.0	40	87.4	60	128.6

Ammonia, Ammonium Hydrate, Ammonia Liquor.

Commercial ammonia or ammonia liquor is the colourless aqueous solution of gaseous ammonia and is distinguished by its very pungent smell. It has a specific gravity of about 0.92 and is consequently lighter than water.

The gaseous ammonia is expelled from the solution by heat and will even evaporate naturally if the solution is left unprotected. Gaseous ammonia can also be liquefied by pressure and is sold as an almost pure liquid in steel cylinders under the name of anhydrous ammonia.

Ammonia has very strong alkaline properties and turns red litmus blue; it neutralises all acids, combining with them to form salts. It evinces a much milder action than caustic soda lye and offers the great advantage that an excess easily evaporates and consequently in many cases exerts no injurious effect.

Ammonia is used for scouring wool, neutralising acids, and for other purposes.

The strength of ammonia is usually determined by means of the hydrometer, for which purpose the following table may be used.

Specific Gravity of Ammonia (Ammonia Liquor) at 59° F.

(Lunge and Wiernik.)

Specific gravity at 59° F.	Per cent (gaseous) ammonia	Specific gravity at 59° F.	Per cent (gaseous) ammonia	Specific gravity at 59° F.	Per cent (gaseous) ammonia
1.000	0.00	0.960	9.91	0.920	21.75
0.995	1.15	0.955	11.34	0.915	23.36
0.990	2.31	0.950	12.74	0.910	24.99
0.985	3.55	0.945	14.22	0.905	26.65
0.980	4.80	0.940	15.63	0.900	28.33
0.975	6.05	0.935	17.12	0.895	30.03
0.970	7.31	0.930	18.64	0.890	31.75
0.965	8.59	0.925	20.18	0.885	33.68

Soda or Soda Ash, Sodium Carbonate or Carbonate of Soda.

Soda is usually sold as a white powder (soda ash, Solvay or ammonia soda) or in the shape of crystals (soda crystals, crystal carbonate). It is chiefly manufactured by the old Leblanc process or by the more recent

Solvay or ammonia process and now also by electrolysis. Before the introduction of the Solvay process, Leblanc soda was frequently very impure and contained amongst other impurities caustic soda and sodium sulphide, whilst Solvay soda, apart from salt, cannot contain any soluble impurities deriving from its manufacture. For this reason Solvay or ammonia soda is frequently preferred for dyeing purposes; Leblanc soda has however also been manufactured in excellent purity for years past.

Soda crystals is crystallised soda containing about 36% pure sodium carbonate and 63% water of crystallisation; also small quantities of Glauber's salt, but no detrimental impurities. Being a relatively expensive product and having no other advantages over good soda ash than that of always possessing approximately uniform strength and dissolving readily in water without forming hard lumps, it is not used very much in dyeing.

Crystal carbonate is also pure crystallised soda containing only 18% water of crystallisation.

Soda is stable on exposure to air. Soda ash easily forms hard lumps in moist air, without however absorbing any considerable quantities of water, It has a less caustic taste and a milder alkaline action than caustic soda. It is neutralised by most acids, such as sulphuric, hydrochloric or acetic acid with evolution of carbon dioxide, and an addition of acids therefore causes an effervescing of the solutions.

Soda dissolves most copiously in water of 90° F.

100 parts of water dissolve the following quantities of pure sodium carbonate at:

32°	41°	50°	59°	68°	86°	90°	93° and 174°	212° F.
7.1	9.5	12.6	16.5	21.4	38.1	59	46.2	45.1 Soda.

Soda ash is put on the market in various degrees of strength, calculated on the supposed percentages of sodium oxide. The chief brands show 48°, 52—56° and 58°, each degree indicating 1 per cent of sodium oxide, 58° consequently corresponding to about 99 per cent of pure sodium carbonate. The usual qualities of 56—58° are pure enough for all dyeing purposes.

Our observations on soda ash have reference to the latter qualities, irrespective of the process by which they are produced. 100 parts of good soda ash are approximately equivalent to 270 parts soda crystals.

The strength of pure soda solutions may be determined with the hydrometer, according to the following table. It must, however, be observed that any impurities present, such as salt, Glauber's salt or sodium sulphide are not separately indicated.

Specific Gravities of Solutions of Sodium Carbonate at 59° F.

Degrees Twaddle	Per cent Sodium carbonate	Degrees Twaddle	Per cent Sodium carbonate	Degrees Twaddle	Per cent Sodium carbonate
1	0.47	11	5.23	21	9.90
2	0.95	12	5.71	22	10.37
3	1.42	13	6.17	23	10.83
4	1.90	14	6.64	24	11.30
5	2.38	15	7.10	25	11.76
6	2.85	16	7.57	26	12.23
7	3.33	17	8.04	27	12.70
8	3.80	18	8.51	28	13.16
9	4.28	19	8.97	29	13.63
10	4.76	20	9.43	30	14.09

Soda is used in wool-dyeing chiefly for neutralising acids, especially after carbonising, and for dyeing Alkaline Blue; also for soap making.

Potassium Carbonate or Carbonate of Potash; Potash.

Potassium carbonate is prepared from wood ashes or from potassium chloride. It forms a white substance which absorbs moisture from the air and is very deliquescent. Apart from its great solubility it closely resembles sodium carbonate.

Potash soaps are milder than sodium soaps and are therefore frequently preferred to the latter for scouring raw wool. Hence they are sometimes prepared for this purpose from "Oleïne" (i. e. crude oleïc acid) and potassium carbonate (see page 368).

Tartar. Potassium Bitartrate. Cream of Tartar. Argol.

Tartar is the acid potassium salt of tartaric acid and is obtained by refining the deposit which forms on the bottom of vats in which the fermentation of wine proceeds. In the crude state it is called argol — red or white according to its colouration; the ordinary purified product is known as "tartar", while "cream of tartar" is nearly pure acid potassium tartrate. The commercial product is sold in the form of crystals or as a powder.

Tartar is used as an assistant in the mordanting of wool with bichromate of potash, as it increases the exhaustion of the bichrome and, by reduction, brings it into a form suitable for the fixation of colouring matters.

For some time past lactic acid, lactoline, oxalic acid and other products are being used with much success in the place of tartar.

Borax, Sodium Bi-borate or Bi-borate of Soda.

White crystals with water of crystallisation, or white powder when anhydrous, fairly soluble in water. Feebly alkaline salt, which impairs the wool but slightly and is therefore frequently used in dyeing Alkaline Blue in order to make the bath weakly alkaline as is required with this dyestuff.

Glauber's Salt, Sodium Sulphate or Sulphate of Soda.

Glauber's salt is used in the form of calcined (or desiccated) and crystallised Glauber's salt. Calcined Glauber's salt is sometimes impure, containing especially an excess of sulphuric acid. Crystallised Glauber's salt contains, if chemically pure, 44,1% anhydrous salt and 55,9% water; the commercial product is fairly pure. The crystallised salt is efflorescent in the air, losing its water of crystallisation, and is easily soluble in water. 100 parts of calcined Glauber's salt are equivalent to 220 parts of crystallised Glauber's salt.

100 parts of water dissolve of calcined Glauber's salt at:

32°	50°	59°	68°	77°	86°	91½°	104°	217½° F.
5	9	13	19	28	40	50	49	42,6 parts.

Specific Gravities of Aqueous Solutions of Calcined Glauber's Salt at 59° F.

Per cent calc. Glauber's salt	Specific Gravity	Per cent calc. Glauber's salt	Specific Gravity	Per cent calc. Glauber's salt	Specific Gravity
1	1.0091	5	1.0457	9	1.0832
2	1.0182	6	1.0550	10	1.0927
3	1.0274	7	1.0644	11	1.1025
4	1.0365	8	1.0737	12	1.1117 saturated

The percentages of crystallised Glauber's salt are found by multiplying the above percentages by 2¼.

Glauber's salt is used mostly in its crystallised form in wool dyeing. In dyeing with Acid Colours, Chrome Colours and Diamine Colours it serves chiefly to retard the absorption of the dyestuffs by the fibre and thus to assist in the production of level shades. In the case of Acid Colours and Chrome Colours which are dyed in acid baths a small amount of free acid in the Glauber's salt is harmless. It may, however, effect a too rapid absorption of the Diamine Colours; hence the Glauber's salt used in dyeing with the latter should have a neutral reaction, i. e. it should not redden blue litmus paper.

When used for machine-dyeing the Glauber's salt must be well soluble and it should therefore be always used in its crystalline form for this purpose.

Sodium Bisulphate or Bisulphate of Soda.

This salt forms a white crystalline mass which is very freely soluble in water. The diluted aqueous solution gradually decomposes into sulphuric acid and neutral sodium sulphate (Glauber's salt), and for this reason bisulphate of soda is used in wool-dyeing instead of a mixture of sulphuric acid and Glauber's salt as a mild agent for gradually acidulating the dye-liquor. 10 parts of bisulphate of soda are practically equivalent to a mixture of 4 parts sulphuric acid and 10 parts crystallised Glauber's salt. Bisulphate of soda being frequently contaminated by iron, the mixture of sulphuric acid and Glauber's salt is usually preferred for dyeing brilliant shades of scarlet. For other purposes, however, the commercial bisulphate is in most cases sufficiently pure.

Sodium Bisulphite or Bisulphite of Soda.

White crystals decomposing in the air with development of heat, usually termed Meta-Sulphite or Pyro-Sulphite.

In dyeing, the aqueous solution of sodium bisulphite is used almost exclusively. It is a colourless liquid, sometimes tinted yellowish by traces of iron, and smelling of sulphur dioxide, of which it usually contains 22—23% and stands at about 64° Tw. Bisulphite of soda is chiefly used for bleaching wool and for preparing hydrosulphite for vat dyeing.

Sodium Hydrosulphite or Hydrosulphite of Soda.

Sodium hydrosulphite is only with difficulty prepared in its pure solid state and is used as an aqueous solution prepared by the action of zinc clippings or zinc dust on bisulphite of soda. It oxidises very rapidly and should therefore be protected as well as possible from the action of the air, by being kept in barrels or bottles well filled and tightly closed. (Hydrosulphite is sometimes erroneously called "hyposulphite of soda".)

Hydrosulphite is chiefly used for preparing the Indigo-hydrosulphite vat and sometimes for stripping coloured shoddy and other materials.

We furnish hydrosulphite for the hydrosulphite vat unter the denomination of Hydrosulphite 0. Owing to the property of all hydrosulphites to decompose easily, it is advisable to provide for delivery only for 6—8 days in advance.

Hydrosulphite for the Indigo vat may be prepared by the dyer in the following way:

10 gallons bisulphite 70 deg. Tw. are diluted with
20 „ water; into this solution
9 lbs zinc dust, made into a paste with
1½ gallons water, are slowly stirred.

The temperature rises thereby, but should not exceed 35° C. (95 deg. F.), for which reason the mixing with the zinc dust paste should be done slowly, especially in hot weather, and the use of as cold water as possible is to be recommended.

After some careful stirring, which must not disturb the liquid too much, it is allowed to settle for one hour, by which time the precipitate has become pale grey.

The clear liquid above the precipitate is then poured quickly into a second vessel containing milk of lime, prepared by slaking

10 lbs quicklime with
2½ gallons water,

stirring the liquor carefully for ¼ hour without disturbing it too much, and allowing it to settle for 2 hours. The clear liquid, now of 20 deg. Tw., and about 16 gallons in volume, is mixed with

¾ pint caustic soda lye 42 deg. Tw. per every 10 gallons,

in order to improve its stability, and stored in closed glass bottles or tin cans filled quite up to the neck.

1 gallon of this solution is equal in strength to about
3 pints Hydrosulphite 0.

The admission of air has to be avoided as much as possible both in making and in storing; vessels should therefore if possible be chosen which can be filled right up to the top and closed air-tight. It is further advisable to divide the stock into several bottles, so that there may be no need to keep it too long in only partly filled vessels.

It is also advisable to prepare stock for a few days' consumption only and to store it in a cool place.

Hydrosulphite also serves for stripping dyed shoddy and other goods and is prepared for this purpose by pouring a mixture of 1 gallon bisulphite of 64° Tw. and 1 gallon cold water over 1 lb zinc dust, stirring well for a short time, allowing the precipitate to settle and using the clear or, if necessary, filtered liquor. For stripping, 1—1½ gallon hydrosulphite and 1 pint acetic acid are added to 25 gallons water before entering the material. The bath is heated to 50—60° C. (120—140 deg. F.) and the material worked for about ¼—½ hour, until the dye is sufficiently stripped off the material. In this way many colours may be destroyed or at least considerably reduced. See also pages 137 and 269.

Hyraldite.

Under the denomination of ***Hyraldite A*** we market a very stable compound of hydrosulphite and formaldehyde. It forms a white mass which is exceedingly soluble in cold or hot water. The solution, contrary to

that of hydrosulphite, is very stable in the neutral or alkaline state, both when hot or cold; on addition of bisulphite, acetic acid or other acids, however, it yields hydrosulphite possessing its well-known powerful reducing action.

On this property is founded the application of Hyraldite A for stripping colours off dyed goods, as recommended on page 137, and also for discharging in printing cotton goods.

Hyraldite W, another brand, is especially well suited for white and coloured discharges in printing, principally in wool printing (see page 348).

Hyraldite is best stored in a cool place in well closed vessels.

Sodium Thiosulphate, Thiosulphate or Hyposulphite of Soda, Antichlorine.

Sodium thiosulphate is a well crystallised and readily soluble salt. It is decomposed by acids, sulphur being separated and sulphur dioxide given off, and is therefore used for mordanting wool with sulphur before dyeing the same with Solid Green or Brilliant Green; see pages 103—104.

Sodium Chlorate or Chlorate of Soda.

Colourless crystals soluble in their own weight of cold or half their weight of hot water, and consequently much more readily soluble than the corresponding potassium salt. Otherwise both salts possess exactly the same properties.

Owing to their powerful oxidising properties, both salts may act as explosives by coming into contact with inflammable substances or under the influence of heat or stroke, and should therefore be stored away from other materials.

Chlorate of soda is a strong oxidising agent and is frequently added to dark print colours, especially to blacks, (in quantities of 1—3 oz per gallon), to prevent the dyestuffs from being reduced by very moist steam.

Sodium Phosphate or Phosphate of Soda.

Crystals which effloresce in the air and are soluble in 25 times their weight of cold water or in their own weight of boiling water.

Phosphate of soda is a mild alkaline salt which is used for fixing Diamine Colours and Basic Colours in wool printing (page 319).

Sodium Tungstate or Tungstate of Soda.

White crystals soluble in 4 parts of cold or in 2 parts of hot water. It is a feebly alkaline salt which is used for printing Basic Colours (page 319) and for reducing the inflammability of textile goods.

Sodium Acetate or Acetate of Soda.

This salt forms clear and very readily soluble crystals which slowly lose their water of crystallisation through exposure to air. It serves for neutralising free mineral acids, forming their salts and liberating free acetic acid. For this reason it is useful to impregnate union goods which have been cross-dyed in an acid bath (especially such as contain cotton warps dyed with Immedial Black or Aniline Black), with acetate of soda thus preventing any residue of free mineral acid from tendering the cotton. Acetate of soda is also used in wool printing (see pages 318 and 319).

Ammonium Acetate or Acetate of Ammonia.

Crystals which are exceedingly soluble in water, but not deliquescent in the air. The solution of the salt smells of ammonia, and red litmus paper is thereby turned faintly blue. The solution is found in commerce and may be easily prepared by mixing

10 oz of ammonia (0,913 sp. g. or 24 %) and
28¼ „ „ acetic acid (8° Tw. or 30 %).

The solution should be neutral and should not materially change either blue or red litmus paper.

Acetate of ammonia serves for mildly acidulating the dyebaths of Diamine Colours and for stripping colours off wool and silk.

Ammonium Oxalate or Oxalate of Ammonia.

Ammonium oxalate is a well crystallised salt which readily dissolves at 15° C. (59 deg. F.) in 24 times its weight of water. The solution of the salt may be prepared by dissolving

1 lb oxalic acid in
1 gallon hot water and neutralising the solution with about 3½ lbs ammonia (0,913 sp. g. or 24 %);

the solution should not change either blue or red litmus paper, and contains about 1⅛ lb oxalate of ammonia (cryst.).

This salt is principally employed when dyeing some Chrome Colours in order to precipitate the lime salts dissolved in hard water and thus render them harmless.

Ammonium Sulphocyanide or Thiocyanate.

This salt forms colourless, very freely soluble crystals. It is chiefly applied in wool dyeing in order to diminish the action of metallic copper on some dyestuffs as it forms a protective coating of cuprous sulphocyanide on the metal. It should therefore be avoided to remove this coating by bright-polishing the metal when cleansing the vessels.

Alum.

Commercial alum is either potash alum or ammonia alum, which show none important differences in their properties.

The solubility of alum may be seen from the following table:

100 parts of water dissolve at:

50°	68°	86°	104°	158°	212° F.	
9.5	15.1	22.0	30.9	90.7	357.5	parts potash alum
9.1	13.6	19.3	27.3	72.0	421.9	parts ammonia alum.

Alum is used as a mordant in wool dyeing and for improving the fastness of colours against water. It is also used for waterproofing. In wool printing it is used as a mild acidifying salt in the place of free acids (see page 319).

Aluminium Sulphate or Sulphate of Alumina.

Sulphate of alumina has the same properties as alum, but is stronger, 100 parts of sulphate of alumina being approximately equivalent to 140—150 parts of alum. Sulphate of alumina sometimes contains an excess of sulphuric acid and small quantities of iron and Glauber's salt. It usually contains 50% pure aluminium sulphate, sometimes even more than 55 per cent.

Aluminium Acetate or Acetate of Alumina.

Acetate of alumina is known in solution only and is usually prepared by mixing solutions of aluminium sulphate and of lead acetate (sugar of lead) or acetate of lime. For 100 lbs of aluminium sulphate, 171 lbs of sugar of lead are used; the two solutions are mixed, and after the precipitate has settled, the clear solution is drawn off for use. In order to free the solution completely from lead, a small quantity of Glauber's salt in solution may subsequently be added.

Acetate of alumina is frequently used for waterproofing. The purer its quality, the better its effect for this purpose and it should therefore best be prepared from aluminium hydroxide and acetic acid. It also serves for fixing some colours in wool printing (page 319).

Chrome-Alum.

Chrome-alum, obtained as a waste product in various chemical works, forms dark crystals which, notwithstanding their beautiful crystalline appearance, may contain a great many impurities, particularly calcium sulphate, tarry and other organic matters and free sulphuric acid.

One part of chrome-alum dissolves in 7 parts of cold or 2 parts of boiling water.

Chrome-alum is sometimes used for fixing Chrome Colours, especially in producing pearl shades with Anthracene Chrome Blue, a brighter shade being obtained than with bichrome. It may also serve for fixing Diamine Colours in the place of fluor chrome.

Chromium Fluoride or Fluor Chrome.

Chromium fluoride is a green crystalline powder which is readily soluble in both cold and hot water and has a corroding action on glass and on most metals.

Fluor chrome is used in wool dyeing to fix some Diamine Colours fast to milling, especially Diamine Fast Red F and Diamine Green G. It also serves in some cases for Chrome Colours, especially in Vigoureux printing, and for dyeing pearl shades with Anthracene Chrome Blue, or pure yellows (and green) with Anthracene Yellow GG, which shades come out brighter with fluor chrome than with bichrome. It also serves instead of bichrome for mordanting wool, 4% chromium fluoride and 2% oxalic acid being generally used for this purpose.

Chromium Formate or Formate of Chrome.

This salt is sold as a greyish green powder, readily soluble in twice its weight of water. Recently it is used instead of fluor chrome in Vigoureux printing for fixing Anthracene Chrome Black and other Chrome or Vigoureux Colours, because the soft feel and the spinning properties of the wool are exceedingly well preserved by its use.

Bichrome or Chrome. Potassium Bichromate. Red Chromate or Bichromate of Potash.

Bichrome forms large yellowish red crystals which are stable on exposure to air and do not contain any water of crystallisation. 100 parts of water dissolve at

32°	50°	104°	176°	212° F.
5	8.5	29.4	73	102 parts bichrome.

Commercial bichrome is almost chemically pure. Bichrome is used in wool dyeing for mordanting, for the fixation of Chrome Colours and also for stripping colours off shoddies.

Sodium Bichromate or Bichromate of Soda. Bichrome or Chrome.

Sodium bichromate contrary to potassium bichromate forms deliquescent crystals containing water of crystallisation; it is much more easily soluble in water than the potassium salt, and for this reason is now frequently used in place of the latter.

It is usually marketed in strength equal to the potassium salt but not always in the same purity. 100 parts of water dissolve at

32°	59°	86°	176°	212° F.
107	209	127	143	163 parts sodium bichromate.

Bichromate of soda is used exactly like the potassium salt and has exactly the same effects.

Copperas or Green Vitriol. Ferrous Sulphate or Sulphate of Iron.

Ferrous sulphate is formed by dissolving iron in diluted sulphuric acid. Copperas, the commercial product, is produced on a large scale from pyrites. It forms bluish green crystals which effloresce on exposure, becoming brownish through oxidation. It is readily soluble in water, but is rapidly oxidised by the action of the air, red ferric hydroxide separating.

Ferrous sulphate or copperas is used in wool dyeing chiefly for mordanting and for fixing Logwood and combinations of Logwood with Naphtyl Blue Black and Naphtylamine Black and for the combination of Naphtyl Blue Black and sumac. For these purposes it is usually applied together with copper sulphate.

Blue Stone or Blue Vitriol. Copper Sulphate or Cupric Sulphate.

Blue transparent crystals fairly soluble in water:

100 parts of water dissolve at:

50°	68°	86°	122°	158°	194°	212° F.
37	42	49	66	95	156	203 parts blue stone.

Copper sulphate is used in wool dyeing for improving the fastness to steaming of some colours, such as Naphtyl Blue Black (all brands) and Naphtylamine Black R, RNB, NBB and rendering certain Diamine Colours faster to light. It also serves for the fixation of some wood colours, mostly in combination with copperas (see for instance page 259).

Tin Crystals or Tin Salt. Stannous Chloride.

This salt is prepared by dissolving tin in hot hydrochloric acid. It is dissolved completely by 1/3 of its weight of water; the clear solution becomes turbid on addition of water by dissociation of the salt, but clear again on addition of hydrochloric, tartaric or other acids.

Tin crystals are very largely used for discharging Acid Colours and Diamine Colours, but are recently replaced in most cases by Hyraldite which yields a better white that does not turn yellow on storing.

Acetate of Tin. (Stannous Acetate.)

Acetate of tin is used in the form of a solution of 28° Tw. for coloured discharging. The solution may be prepared in the following manner:

10 lbs stannous hydrate paste (see below) are dissolved in
1— 1 1/2 gallons acetic acid 8° Tw. and diluted with water to 28° Tw.;

or:

20 lbs tin crystals are dissolved in
9 „ water and stirred into the hot solution of
30 „ sugar of lead in
20 „ water and
2 1/4 „ acetic acid 8° Tw.; when cold, the clear fluid is drawn off the precipitate and diluted with water to 28° Tw.

The solutions do not keep very long.

Stannous Hydrate Paste.

10 lbs tin crystals are dissolved in
4 gallons water and precipitated with
0,7 „ ammonia; the temperature should not exceed 45° C (115 deg. F.).

The precipitate is washed out several times by decanting with water and pressed off until it contains about 50% of dry matter.

The paste oxidises fairly rapidly.

Soap.

Soaps are usually classified as hard or soda soaps and soft or potash soaps. The latter contain almost all the impurities of the raw materials, the surplus of alkali and glycerine, and are only used in cases where these impurities are unimportant, and especially where the disagreeable smell, which they impart to the goods, is not objected to.

By "hard" soaps, purified soaps are understood, which have been freed, though often only imperfectly, from an excess of alkali and glycerine.

In wool dyeing, either hard olive-oil soap is usually employed which is prepared from olive oil and caustic soda lye and should be free from an excess of alkali, glycerine and ill-smelling fats, or the cheaper kinds of soft soaps which contain varying amounts of free potash or soda. These soft soaps are prepared from various fats such as tallow, lard, oleïc acid, palm oil, cotton seed oil etc. Soaps prepared from oleïne (oleïc acid) and potash or soda (see page 368), such as are generally used for milling, are also frequently employed by wool dyers for scouring yarns etc.

Hydrogen Peroxide.

Hydrogen peroxide is used as a colourless aqueous solution prepared by decomposing barium peroxide, or sometimes sodium peroxide, with dilute sulphuric acid. The bleaching action of hydrogen peroxide is based on its property of readily developing oxygen, and it is therefore used as a bleaching agent. The strength of the commercial solution is usually expressed in volumes of oxygen evolved by 1 volume of the liquid, the usual strength of 12 volumes corresponding to 3 % hydrogen peroxide.

The product keeps best at a low temperature in a dark place and if acidulated with small quantities of acid. An addition of 1½ oz naphthalene or 1 pint alcohol or ether to 10 gallons of the solution are favourable to its stability. It readily gives off the oxygen in the presence of alkalies or on heating. Some metals also exert a decomposing action on hydrogen peroxide, and it is therefore best kept in well-tarred casks or in carboys.

Hydrogen peroxide serves for bleaching white yarns and tissues.

Sodium Peroxide.

Sodium peroxide is a white powder, deliquescent in the air and absorbing carbon dioxide, whilst liberating oxygen. It dissolves in water with evolution of heat, and on boiling gives off oxygen. On dissolving in sufficiently cooled, acidulated water it forms hydrogen peroxide and the corresponding sodium salt, and it is therefore used for bleaching in place of hydrogen peroxide. In contact with combustible substances it ignites them and should therefore be handled with care.

Sodium peroxide develops 20 % oxygen, whilst hydrogen peroxide of 12 per cent of volume yields but 1½ % oxygen; furthermore sodium peroxide, contrary to hydrogen peroxide, may be kept a very long time, if well stored.

Sodium peroxide, like hydrogen peroxide, is used for bleaching purposes.

Bleaching Powder or Chloride of Lime. Calcium Hypochlorite.

Bleaching powder is a white powder smelling of chlorine; it should be free of lumps. It becomes moist on exposure to air, absorbs carbon dioxide and forms then a doughy mass. It develops heat when stirred with a little water and dissolves in twenty times its weight of water, but always leaves a considerable insoluble residue. Good bleaching powder contains 35—39% active chlorine. It slowly decomposes when stored, thereby losing in strength. The decomposition may even take place with an explosive violence.

For preparing a solution of chloride of lime, 1 part of bleaching powder is mixed with 3 parts of water to a paste and then diluted again with 3 parts water; after settling, the clear solution is diluted to the desired strength.

Chloride of lime is used for the chlorinating of certain kinds of yarn (page 208), and of fabrics to be printed (page 315).

Sulphur.

Sulphur is sold in form of lumps as roll sulphur or as a crystalline powder called flower sulphur.

It melts at 114,5 (238 deg. F.) and sublimates and evaporates at higher temperatures. When lighted or heated in the air, it burns with a blue slightly luminescent flame and formation of a suffocating gas of a characteristic smell, called sulphur dioxide or sulphurous acid.

The use of this gas for bleaching wool and silk is based on its production by burning sulphur in sulphur stoves. The burning of sulphur should be so regulated as to avoid too great a development of heat. The sulphur is best set on fire by means of a red-hot piece of iron or live coals.

Tannic Acid or Gallo-Tannic Acid.

Tannic acid occurs in many tannin substances, especially in gall-nuts and in genuine sumac (from Rhus coriaria). It is sold in the form of light-coloured powders or yellowish to brownish scales, or brittle and vitreous or loose and spongy masses, which become darker in the light. It dissolves in 6 parts of cold water, and still more readily in hot water, and is freely soluble in dilute alcohol, dilute acetic acid and glycerine. Alkaline solutions become strongly coloured.

Tannic acid is used in wool dyeing principally for fixing certain colours fast to water (see page 274).

Sumac.

Commercial sumac usually consists of the whole or the crushed or pulverised leaves; the stalks of the leaves and small stems are frequently admixed. Good qualities have an olive-green colour and a pleasant smell; they contain 15 – 20% and sometimes over 25% tannin. Sumacs, which are dull in colour and have a musty smell, have deteriorated by moisture and prolonged storing.

Sumac is chiefly used in the form of sumac extract in combination with Naphtyl Blue Black and Naphtylamine Black for the production of deep shades (see page 260).

Sumac extract is sold as a thick, dark brown liquid of about 52° Tw., or in the solid state. Decolourised sumac extracts may as a rule replace the tannic acid even for light shades.

Liquid sumac extract is rather apt to ferment, losing thereby in strength.

Weights and Measures.
Hydrometer and Thermometer Tables.

I. Metric System.

1 metre (m) = 10 decimetres (dm) = 100 centimetres (cm) = 1000 millimetres (mm).

1 litre (l) = 1000 cubic centimetres (cc or ccm). 1 cubic metre (cbm) = 1000 litres.

1 gramme (g or gr or grm) = 10 decigrammes (dg) = 100 centigrammes (cg) = 1000 milligrammes (mg).

1 kilogramme (kg or kilo) = 1000 grammes.

1000 kilogrammes = 1 ton (t) i. e. metric ton.

100 kilogrammes = 1 metric or double centner or quintal.

50 kilogrammes = 1 centner (or nearly 1 hundredweight).

10 grammes = 1 dekagramme (deka or Dg). 100 grammes = 1 hektogramme (hg).

The gramme is the standard unit of weight of the metric system and is equal to the weight of 1 cubic centimetre of pure water (measured whilst at its greatest density, in vacuum under a latitude of 45 degrees, at sea level). Hence the following relations of weights and measures are obtained:

1 cubic centimetre water = 1 gramme.
1 litre „ = 1 kilogramme.
1 cubic metre „ = 1 ton.

II. English Weights and Measures.

1 yard (yd) = 3 feet. 1 foot (') = 12 inches ("). 1 inch = 12 lines ("').

1 yard = 91.44 centimetres. 1 foot = 30.48 centimetres. 1 inch = 2.54 centimetres.

1 metre = 1.094 yards = 3.281 feet = 39.37 inches.

1 Imperial gallon (gall.) = 4 quarts (qts) = 8 pints (pts) = 32 gills.
1 Imperial gallon = 4.544 litres. 1 litre = 0.220 Imperial gallon.
1 pint = 0.568 litre. 1 litre = 1.761 pints.

In England by the term gallon (gall.) the Imperial gallon is meant, whilst in the United States of America the considerably smaller apothecary's or wine gallon is usually understood by this term. In England the ton or gross ton of 2240 lbs is also exclusively in use, whilst in the United States the term "ton" may refer either to the gross ton of 2240 lbs or the short ton of 2000 lbs avoirdupois. The weights and measures used in this book always refer to the Imperial gallon.

1 wine gallon = 4 quarts = 8 pints.
1 wine gallon = 3.785 litres. 1 litre = 0.264 wine gallon.
1 pint (apothecary's measure) = 0.473 litre. 1 litre = 2.114 pints (apothecary's measure).
1 Imperial gallon = 1.2 wine gallon. 1 wine gallon = 0.835 Imperial gallon.

1 pound avoirdupois (lb) = 16 ounces (oz) = 256 drachms (drm)
1 pound avoirdupois approximately = 7000 Troy grains (gr)

1 ton (gross ton) = 20 hundredweights (cwt) = 2240 lbs.
1 hundredweight = 4 quarters (28 lbs each) = 112 lbs.

1 ton = 1016 kilogrammes. 1 pound avoirdupois = 453.593 grammes.
1 ounce = 28.349 grammes. 1 Troy grain = 0.065 grammes.
1 kilogramme = 2.205 lbs avoirdupois. 1 gramme = 15.434 Troy grains.

1 Imperial gallon holds 10 pounds avoirdupois or 70000 grains water (measured at 62° F. under a barometric pressure of 30 inches).
1 wine gallon holds only 8.35 lbs water.

III. Russian Weights and Measures.

1 sagèn = 3 arshin = 7 feet.
1 foot = 12 inches. 1 arshin = 16 vershock.
1 foot = 30.48 centimetres. 1 inch = 2.54 centimetres. 1 Russian foot or inch equal to 1 English foot or inch respectively.

1 arshin = 71.12 centimetres. 1 vershock = 4.45 centimetres.
1 metre = 3.28 feet = 39.37 inches = 1.41 arshin = 22.50 vershock.

1 vedro = 8 stof = 12 quart = 30 krushki.
1 vedro = 12.30 litres. 1 stof = 1.54 litre. 1 quart = 1.02 litre.
1 litre = 0.0813 vedro = 0.9756 quart.

1 pood = 40 pound (Russian). 1 pound = 32 lot = 96 solotnik.
1 pood = 16.38 kilogrammes. 1 kilogramme = 0.06 pood.
1 pound (Russian) = 409.51 grammes. 1 lot = 12.48 grammes. 1 solotnik = 4.16 grammes.
1 kilogramme = 2.44 pounds (Russian).

In Russian Poland the following weights and measures are used:

1 ell = 2 feet = 0.81 arshin = 12.96 vershock.
1 foot = 12 inches = 0.945 Russian foot = 11.34 Russian inches.
1 ell = 57.6 centimetres. 1 foot = 28.8 centimetres.
1 pound = 32 lots = 0.99 Russian pound = 405.50 grammes.
1 centner = 4 stone = 100 pounds = 2.476 pud.

Comparison of the Thermometer Tables of Celsius (Centigrades), Fahrenheit and Réaumur.

Degrees			Degrees			Degrees		
Celsius	Fahrenheit	Réaumur	Celsius	Fahrenheit	Réaumur	Celsius	Fahrenheit	Réaumur
0	32.0	0.0	34	93.2	27.2	68	154.4	54.4
1	33.8	0.8	35	95.0	28.0	69	156.2	55.2
2	35.6	1.6	36	96.8	28.8	70	158.0	56.0
3	37.4	2.4	37	98.6	29.6	71	159.8	56.8
4	39.2	3.2	38	100.4	30.4	72	161.6	57.6
5	41.0	4.0	39	102.2	31.2	73	163.4	58.4
6	42.8	4.8	40	104.0	32.0	74	165.2	59.2
7	44.6	5.6	41	105.8	32.8	75	167.0	60.0
8	46.4	6.4	42	107.6	33.6	76	168.8	60.8
9	48.2	7.2	43	109.4	34.4	77	170.6	61.6
10	50.0	8.0	44	111.2	35.2	78	172.4	62.4
11	51.8	8.8	45	113.0	36.0	79	174.2	63.2
12	53.6	9.6	46	114.8	36.8	80	176.0	64.0
13	55.4	10.4	47	116.6	37.6	81	177.8	64.8
14	57.2	11.2	48	118.4	38.4	82	179.6	65.6
15	59.0	12.0	49	120.2	39.2	83	181.4	66.4
16	60.8	12.8	50	122.0	40.0	84	183.2	67.2
17	62.6	13.6	51	123.8	40.8	85	185.0	68.0
18	64.4	14.4	52	125.6	41.6	86	186.8	68.8
19	66.2	15.2	53	127.4	42.4	87	188.6	69.6
20	68.0	16.0	54	129.2	43.2	88	190.4	70.4
21	69.8	16.8	55	131.0	44.0	89	192.2	71.2
22	71.6	17.6	56	132.8	44.8	90	194.0	72.0
23	73.4	18.4	57	134.6	45.6	91	195.8	72.8
24	75.2	19.2	58	136.4	46.4	92	197.6	73.6
25	77.0	20.0	59	138.2	47.2	93	199.4	74.4
26	78.8	20.8	60	140.0	48.0	94	201.2	75.2
27	80.6	21.6	61	141.8	48.8	95	203.0	76.0
28	82.4	22.4	62	143.6	49.6	96	204.8	76.8
29	84.2	23.2	63	145.4	50.4	97	206.6	77.6
30	86.0	24.0	64	147.2	51.2	98	208.4	78.4
31	87.8	24.8	65	149.0	52.0	99	210.2	79.2
32	89.6	25.6	66	150.8	52.8	100	212.0	80.0
33	91.4	26.4	67	152.6	53.6			

Comparison of Hydrometer Degrees Twaddle and Baumé with the Specific Gravities for Liquids heavier than Water.

Degrees Twaddle	Degrees Baumé	Specific Gravity	Degrees Twaddle	Degrees Baumé	Specific Gravity	Degrees Twaddle	Degrees Baumé	Specific Gravity
1	0.7	1.005	58	32.4	1.290	116	53.0	1.580
2	1.4	1.010	60	33.3	1.300	118	53.6	1.590
4	2.7	1.020	62	34.2	1.310	120	54.1	1.600
6	4.1	1.030	64	35.0	1.320	122	54.7	1.610
8	5.4	1.040	66	35.8	1.330	124	55.2	1.620
10	6.7	1.050	68	36.6	1.340	126	55.8	1.630
12	8.0	1.060	70	37.4	1.350	128	56.3	1.640
14	9.4	1.070	72	38.2	1.360	130	56.9	1.650
16	10.6	1.080	74	39.0	1.370	132	57.4	1.660
18	11.9	1.090	76	39.8	1.380	134	57.9	1.670
20	13.0	1.100	78	40.5	1.390	136	58.4	1.680
22	14.2	1.110	80	41.2	1.400	138	58.9	1.690
24	15.4	1.120	82	42.0	1.410	140	59.5	1.700
26	16.5	1.130	84	42.7	1.420	142	59.9	1.710
28	17.7	1.140	86	43.4	1.430	144	60.4	1.720
30	18.8	1.150	88	44.1	1.440	146	60.9	1.730
32	19.8	1.160	90	44.8	1.450	148	61.4	1.740
34	20.9	1.170	92	45.4	1.460	150	61.8	1.750
36	22.0	1.180	94	46.1	1.470	152	62.3	1.760
38	23.0	1.190	96	46.8	1.480	154	62.8	1.770
40	24.0	1.200	98	47.4	1.490	156	63.2	1.780
42	25.0	1.210	100	48.1	1.500	158	63.7	1.790
44	26.0	1.220	102	48.7	1.510	160	64.2	1.800
46	26.9	1.230	104	49.4	1.520	162	64.6	1.810
48	27.9	1.240	106	50.0	1.530	164	65.0	1.820
50	28.8	1.250	108	50.6	1.540	166	65.5	1.830
52	29.7	1.260	110	51.2	1.550	168	65.9	1.840
54	30.6	1.270	112	51.8	1.560	169	66.1	1.845
56	31.5	1.280	114	52.4	1.570	170	66.3	1.850

Note:

The degrees in Twaddle's hydrometer bear a direct relationship to the specific gravity and may be obtained from the same by the following formula in which d represents the specific gravity and n the number of degrees Twaddle: $n = \frac{1000\,d - 1000.}{5}$ On the other hand by the formula

$d = \frac{5\,n + 1000}{1000}$ the degrees Twaddle are converted into the corresponding specific gravity. For values below 2.0 the degrees Twaddle may also be obtained from the specific gravity by moving the decimal point two figures to the right, striking off the first figure and multiplying the rest by 2, as per the following example:

Specific gravity 1.133:
113.3:
13.3 × 2
26.6° Twaddle.

Comparison of Hydrometer Degrees Baumé with the Specific Gravity of Liquids lighter than Water.

Degrees Baumé	Specific Gravity	Degrees Baumé	Specific Gravity	Degrees Baumé	Specific Gravity	Degrees Baumé	Specific Gravity
11	0.993	16	0.960	21	0.930	26	0.901
12	0.987	17	0.954	22	0.924	27	0.896
13	0.980	18	0.948	23	0.918	28	0.890
14	0.973	19	0.942	24	0.913	29	0.885
15	0.967	20	0.936	25	0.907	30	0.880

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